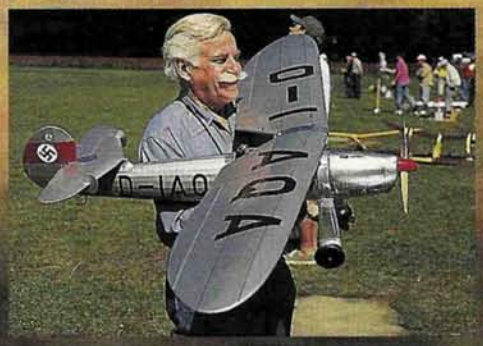
MODEL AIRPLANE NEWS

NEW PRODUCTS FOR '95

E WORLD'S PREMIER R/C MODELING MAGAZINE

48120

February 1995



NUS!

ERVO
GUIDE

PECS
PPLICATIONS
EW TECHNOLOGY

COVERING
A RADIAL
COWL

ILD
ALE
WLER FLAPS

FUTABA
ACROSTAR
120

RC
ECTRIC FLY
H TECH TAKES TO THE SKIES!

STED THIS ISSUE:
OBAL SKYRAIDER
OKI 1.80 2-STROKE
INGMASTER DESIGN SOFTWARE

USA $3.50 CANADA $4.50

UPC 0 09128 48120 3 02>

NSTRUCTION: D-DAY SPITFIRE Mk VIII

FEBRUARY 1995 VOLUME 123, NUMBER 2

MODEL AIRPLANE NEWS

FEATURES

ABOVE: *Ross Weaver from Indianapolis, IN, built this C130 Hercules from drawings he obtained via Compuserve from a friend in Germany. The photo was taken by Bill Griggs at the '94 KRC Electric Fly.*

ON THE COVER: *Keith Shaw's deHavilland Comet—Black Magic—caught during takeoff at the '94 KRC Electric Fly. It's a 1/6-scale replica of a 1934 British long-distance racer, and it's powered by twin Astro Flight cobalt 25s on 28 cells. (Photo by Frank Masi.) Inset photos (top to bottom): Steven Stratt holds his 66-inch Focke Wulf FW-56 (Best Scale Aircraft at the '94 KRC); Futaba's Acrostar 120. (Photos by Bill Griggs and Tom Atwood.)*

FEATURES

CONSTRUCTION

COLUMNS

COLUMNS

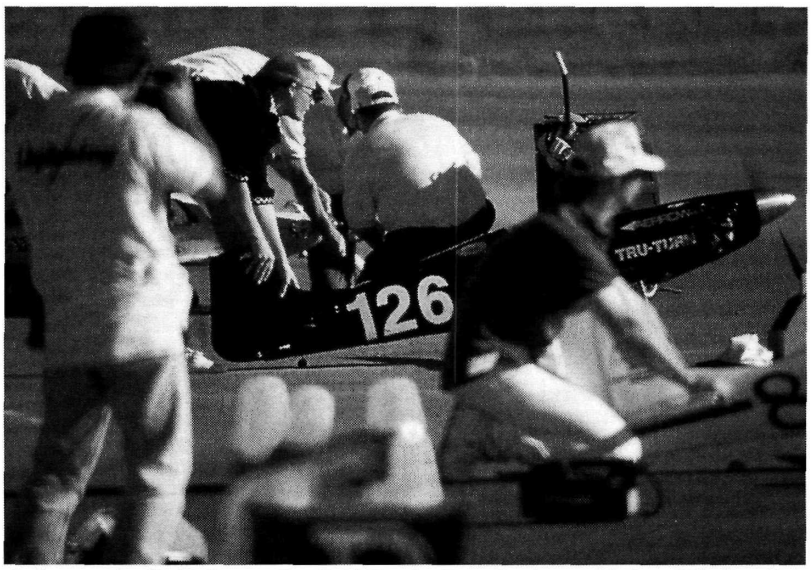
DEPARTMENTS

odel Airplane News (ISSN 0026-7295) is published monthly by **Air Age, Inc.,** 251 Danbury Rd., Wilton, CT 06897. Second-class postage paid at Wilton, CT, and at additional mailing offices. ubscription rates: $27.95 for 1 year (Canada, $43.82—includes G.S.T.; foreign, $40.95); $49.95 for 2 years (Canada, $81.27—includes G.S.T.; foreign, $75.95). **Postmaster:** send Form 3579 to **Model rplane News,** P.O. Box 428, Mount Morris, IL 61054.

EDITORIAL

FRANK MASI

GIANT-SCALE RACING IN TRANSITION



Action on the flight line as the Gold Trophy Race begins at Madera '94. See Rob Wood's complete coverage next month. (Photo by Rob Wood.)

The Mandarin Chinese language uses one word symbol to depict the concepts of crisis and opportunity. This relegates judgment to the perspective of the observer. Nowhere in the model airplane world can one find a better illustration of this study in perspective than in the metamorphosis of the sport of giant-scale racing. Launched by two visionaries—Tom Easterday and Cliff Adams—at Madera, CA, in 1991, the sport has experienced phenomenal growth, with no less than six races held in 1994 and more scheduled for 1995.

Growth and pain are two concepts that should also share the same word symbol; it seems that one can't exist without the other. After the first race in 1991, Easterday and Adams went their separate ways, and the future of the sport looked bleak. It takes close to $100,000 to stage a first-class event, and not many in the community have the resources or desire to gamble on breaking even—much less making a profit.

Lesley Burnett and Nancy Bridi chose to step into the breach, and they took up the fallen reins of the fledgling sport at Madera '92. Despite lean budgets, organizational snafus and mistakes made, the two have managed to keep the momentum going for the past three years. This momentum has spawned other races—some successful, some not as successful—in other parts of the country, including Tucson, Reno, Muncie, the Aviation Expo and Galveston.

So where does giant-scale racing stand today? On one hand, more races than ever before are proposed for 1995, and new classes have been introduced (Formula One and Golden Age racing made their debuts this year), and more and more people are throwing their hats into the ring. On the other hand, a split has occurred in the racing endeavors of the two major groups (Texas and California), and this may lead either to continued growth or to paralysis.

What are the issues? The Texas group has chosen a 6ci maximum displacement for its Formula One rules along with a 10 percent minimum airfoil thickness, while the Madera rules limit the Formula One engines to 4.6ci and the airfoils to 13 percent. The differences may not seem too drastic, but the effect on the sport is profound: engine suppliers don't know which engine to develop, kit manufacturers are faced with the grim prospect of developing two models of each racer they kit, and the pilots and crews are forced to choose one event over another, or spend twice as much time and money as they would have had the rules been standardized.

In addition, the Texas group is starting an association to rival the Giant Scale Racing Association (GSARA), thus fracturing the sport into factions—a division that will either threaten the continuity of the sport or stimulate refinement through healthy competition. (Read this issue's "Sporty Scale" column by Frank Tiano to learn more about this new association.)

Everyone at *Model Airplane News* sincerely wish both groups success in their endeavors, and we urge both to seek a friendly resolution to the discrepancies in their rules—for the good of the sport, and for everyone involved. If you have an opinion on this subject, I urge you to write in, or e-mail me at frankm.@airage.com.

ACE R/C GOING STRONG

There is good news regarding Ace R/C—the 42-year-old radio and kit manufacturer that recently appeared to be shutting its doors. As of November 1, assets of the Higginsville, Missouri-based company were acquired by Joseph M. Kessinger, a CPA from Kansas City. In a recent conversation with Kessinger, he pointed out that the transition was seamless, so, technically speaking, Ace had never actually been "out of business." According to Kessinger, the Ace line of products remains unaffected by the change, although in-depth analysis and possible "focusing" of the line are in the company's foreseeable future. He also adds that former owners Tom and Donna Runge are still active within the structure of the company. ■

MODEL AIRPLANE NEWS

Group Publisher	LOUIS V. DeFRANCESCO JR.
Publishers	DR. LOUIS V. DeFRANCESCO YVONNE M. DeFRANCESCO
Associate Publisher	GARY DOLZALL
Group Editor-in-Chief	TOM ATWOOD
Executive Editor	FRANK MASI
Senior Editor	CHRIS CHIANELLI
Associate Editor	GERRY YARRISH
Assistant Editor	DEBRA D. SHARP
Copy Director	LYNNE SEWELL
Senior Copy Editor	KATHERINE TOLLIVER
anaging Art Director	ALAN J. PALERMO
ssociate Art Director	BETTY K. NERO
Graphic Artists	ROBIN DEMOUGEOT MICHAEL BOUSE
Staff Photographer	WALTER SIDAS
Systems Manager	GORDON OPPENHEIMER
Director of Marketing	GARY DOLZALL
Circulation Manager	JEAN BINGHAM ABBOTT
Marketing Manager	MICHELLE HAMILTON
Production Manager	MARY REID McELWEE
roduction Assistant	ARLENE MELKO
dvertising Manager	SHARON WARNER
dvertising Account Executives	SHELLEY BYINGTON JILL E. SHERTER JILL ELLEN MOLINARO JENNIFER IZZO
Advertising Traffic Coordinator	ELISE SILKOWSKI

RIPTION PRICES: U.S. & Possessions (including APO & FPO): (12 issues), $27.95; 2 years (24 issues), $49.95. Canada: 1 43.82; 2 years, $81.27 (Canadian prices include G.S.T.). ıre: 1 year, $40.95; 2 years, $75.95. Payment must be in U.S. Single-copy prices: $3.50 (USA); $4.50 (Canada). Canadian egistration no. R130754872.

AIRPLANE NEWS (ISSN 0026-7295, USPS 533-470) is pub- nonthly by Air Age, Inc., 251 Danbury Rd., Wilton, CT 06897. icut. Editorial and Business Offices, 251 Danbury Rd., Wilton, 97. Phone: 203-834-2900. FAX: 203-762-9803. Michael F. Chief Executive Officer; Y.P. Johnson, President; G.E. esco, Vice President; L.V. DeFrancesco, Secretary; Yvonne M. esco, Treasurer. Second Class Postage Permit paid at Wilton, icut, and additional Mailing Offices.

BUTIONS: To authors, photographers, and people featured in gazine, all materials published in *Model Airplane News* become usive property of Air Age, Inc., unless prior arrangement is writing with the Publisher. The Publisher assumes no respon- or unsolicited material. Only manuscripts and supporting mate- mpanied by an SASE will be returned.

TISING: Advertising rates available on request. Please send ng materials, insertion orders, etc., to *Model Airplane News,* ing Dept., Air Age, Inc., 251 Danbury Rd., Wilton, CT 06897. 203) 834-2900. FAX: (203) 762-9803.

OF ADDRESS: To make sure you don't miss any issues, send w address to *Model Airplane News,* Subscription Dept., P.O. , Mount Morris, IL 61054, six weeks before you move. Please he address label from a recent issue, or print the information s shown on the label. The Post Office will not forward copies ou provide extra postage. Duplicate issues cannot be sent.

STER: Please send Form 3579 to *Model Airplane News,* P.O. Mount Morris, IL 61054

Member Audit Bureau of Circulations

PRINTED IN THE USA

AIRWAVES

WRITE TO US! We welcome your comments and suggestions. Letters should be addressed to "Airwaves," **Model Airplane News**, 251 Danbury Road, Wilton, CT 06897. Letters may be edited for clarity and brevity. We regret that, owing to the tremendous numbers of letters we receive, we cannot respond to every one.

LAST WORD ON FLOATS?

Please congratulate Dave Windom for an excellent article on floats in the August '94 issue of *Model Airplane News*. As you know, I've probably had more articles on R/C seaplanes and floats published than any other author. Over the years, much misinformation on floats has been published—as we grew from the arbitrary rules of thumb to the level of well-proven empirical designs.

The first published, functional, R/C model, flat-bottom, float designs were on my Seasquare GT (*American Aircraft Modeler* 11/74) and Seasquare (*Model Builder* 3/76). The latter first flew around 1973. It was a Skonk Works project that worked so well that it was soon demonstrated for all to see. The GT version was a derivative that flew pattern-type maneuvers very well. Ken Willard and others soon followed. They learned, as Dave Windom says, that "They're easier to build [and] they get up on the step faster."

The essentials of model float/hull design are simple: make them big enough to float the model, put the step approximately under the CG, provide 5 to 7 degrees of rotation for takeoff and use a strong mount to eliminate gear flexing.

Dave's float design provides all the essentials and goes on to provide very fine construction techniques. His design is definitive, in my opinion.

GEORGE WILSON
Marstons Mills, MA

MUFFLERS FOR MAGNUMS

Help! I've just completed what's probably one of my best models, but after installing the engine, I found that the muffler doesn't fit. I worked out that unless I can find a 2-inch-long extension, I'll have to use a Pitts-style muffler.

This may sound as if it's a small problem, but it's a really big one to me, because I live in the United Arab Emirates and we don't have a good supply of spares here.

The type of engine that I need the Pitts-style muffler for is a Magnum Pro .45. Could you possibly tell me of any companies that stock mufflers of this sort and give me their addresses? Thank you very much, and believe me, I'm very desperate.

DEAN JAMES NAGUIB
Dubai, U.A.E.

Dean, two companies can help you: Davis Model Products, P.O. Box 141, Dept. M, Milford, CT 06460, (203) 877-1670, and Slimline Mfg., P.O. Box 3295, Scottsdale, AZ 85271, (602) 967-5053. Both companies offer Pitts-style mufflers for a variety of engines, and many of the mufflers have adapters that you can order as well. Davis Soundmaster mufflers are very effective and are designed to fit a range of engine volume rather than a specific brand of engine. Slimline Mufflers are also high quality and are made of machined aluminum with their parts brazed together. Both brands of muffler are made in the USA and are worthy of your consideration. GY

French photo-journalist Guy Revel (left) holds the Rocket pylon racer, which was designed by Bill Griggs (right).

ROCKET RACER

First, let me thank you for your efforts in the production of a truly first-class modeling magazine. Most recently, I enjoyed reading your review of the Uravitch-designed Fokker D-VII. I'm a big fan of the D-VII and I think this will probably be my next version. Nc

doubt, I won't be the only one sold on it by your remarks.

I'm hoping that you can give me a hand with a little research. I was at the KRC Electric Fly-In recently and I saw an amazing thing about which I'd like to know more. There was a small, electric, pylon racer that was tearing up the skies in an unbelievable fashion. It might have been called the "Rocket," but this is only a guess. I was pointed toward its designer but, unfortunately, I wasn't able to talk to him because of time constraints. Rumor has it that he's putting out a limited supply of partial kits for about $20. I need to be on the receiving end of one of these packages.

Please let me know how to contact him, if you know who I've described. If you don't know, I'd appreciate any leads you might be able to offer. I can be reached at the address below, and on the internet at thayer@crl.com.

THAYER SYME
32 Gramercy Park S., Apt 11F
New York, NY 10003

Thayer, you're in luck. The designer of the Rocket pylon racer is Bill Griggs, who's also the author of our KRC coverage in this issue. We called Bill and he said, yes, the partial kits are still available, but you'll have to pay the shipping costs. You can reach Bill at 206 State St., Canastota, NY 13032, (315) 697-8152. Check for Bill's coverage of the KRC meet; a lot of exciting and interesting things are happening in the world of electric flight. GY

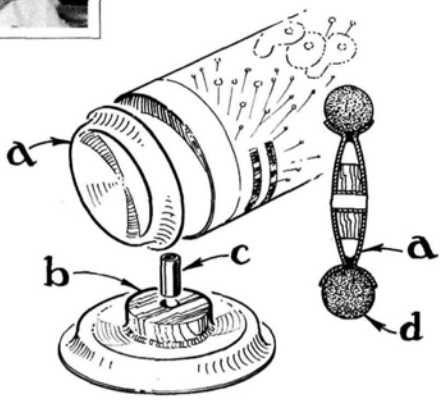
ERRATA

An incorrect phone number for Vailly Aviation was printed in our December '94 issue. The correct number is: (516) 732-4715 (after 6:30 P.M. EST).

HINTS & KINKS

JIM NEWMAN

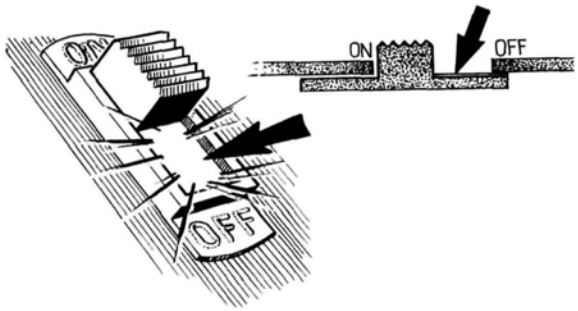
Model Airplane News will give a free one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Hints & Kinks." Send a rough sketch to Jim Newman c/o Model Airplane News, 251 Danbury Rd., Wilton, CT 06897. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we can't acknowledge each one, nor can we return unused material.



"Lite" Old-Timer Wheels

Cut the bottoms (a) off two beverage cans, glue a round, hardwood block (b) in the center, then epoxy the two ends face-to-face. When the glue has cured, carefully mark and drill the center for the brass tube bushing (c). Finally, fit a large rubber O-ring tire (d) from the hardware-store plumbing department.

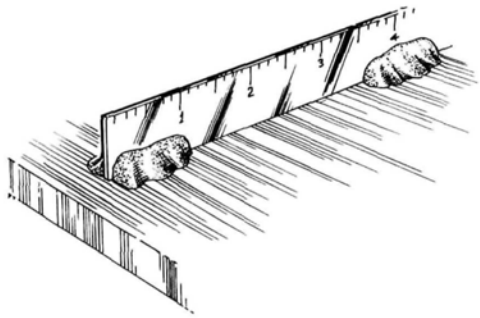
Fabio Nobre Gil, Piracicaba, Brazil



TX Visible "ON" Signal

Remove the switch bezel from your transmitter, then apply Day-Glo paint or a sticker—bright red or pink—to the slide that is immediately below the switch knob. When the switch is left on, the label will be visible to all.

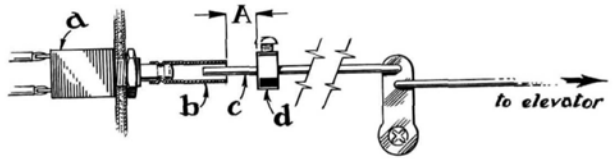
Greg Hildebrandt, Winamac, IN



Instant Knife-Edge Balancer

Use modeling clay—Blue Tac or Prestik, depending on where you are in the world—to wedge a steel ruler upright on your bench. This will allow you to quickly check the balance of wings, etc., before you cover them.

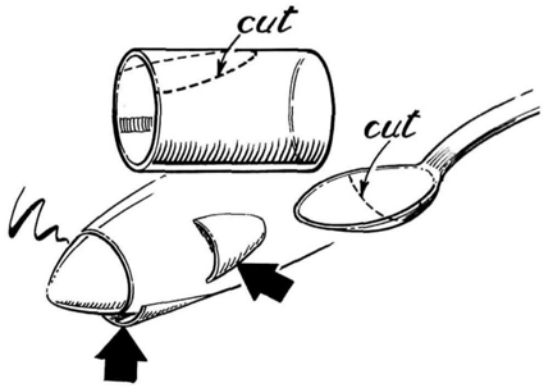
Ed Baumgartner, Halfway House, South Africa



Full-Down On/Off

Select a light-action, push-on/push-off switch (a), file a groove around the knob, then crimp a brass tube (b) around the knob as shown. Fit a pushrod (c) with wheel collar (d) to the outer hole of the elevator servo arm, and adjust dimension "A" so that the collar presses the switch "on" with full down-elevator. Haydn says a quick blip of full-down is quite safe, even as low as 5 feet (1.5 meters).

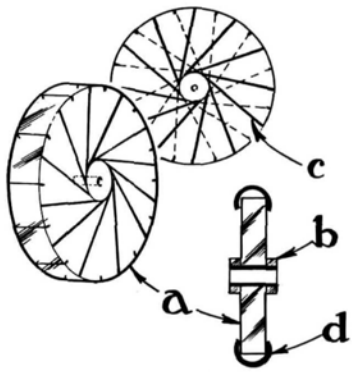
Haydn Trudgen, Templestowe, Victoria, Australia



Ready-Made Air Scoops

Make air scoops out of plastic pill containers and plastic spoons by cutting them as shown. Bill says that you can reverse and recess them to dress up hot-air outlets, too.

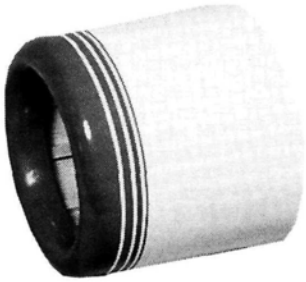
Bill Braatz, Merrillville, IN



Small Spoked Wheels

Cut disks of Plexiglas™ (a) and, depending on the model size, add doublers (b) to each side. Carefully scribe spokes (c) on each side, as shown by the full and dashed lines, paint the spokes silver or black, drill the wheels for a metal-tube bushing, then glue split-rubber-tubing tires (d) around the edge, as shown.

Jay Wallace, Ashland, OR



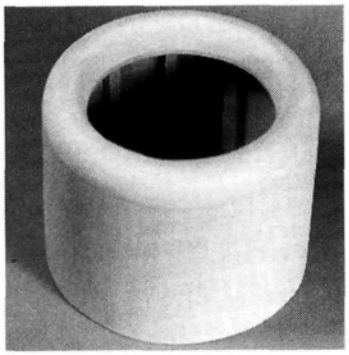
Editor's note: in the January issue, we showed you how the author makes lightweight, coverable and inexpensive radial cowls out of plywood and balsa. Here is his covering method.

Patience and special techniques make it easier than it appears

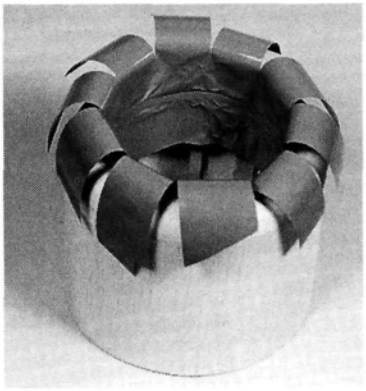
HOW TO Cover a Radial Cowl

by FAYE STILL

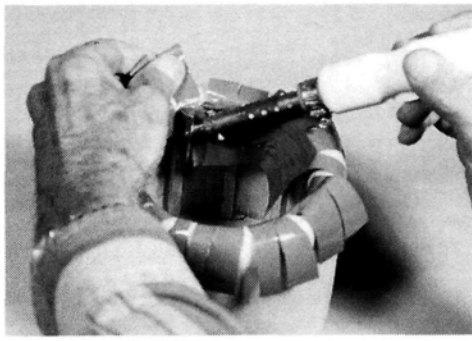
■ Covering a radial cowl is a little like covering one side of a doughnut. At first glance, you wonder how the covering can possibly be formed around the nose-ring's compound curve. It can, but it takes some patience and some special techniques. ■



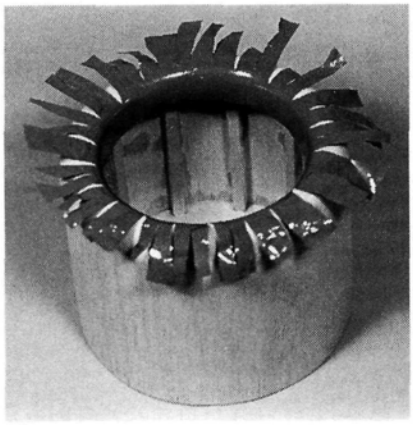
1 This cowl has been sanded, vacuumed and cleaned thoroughly with a tack cloth. To get an extra-smooth finish, the final sanding was done with 600-grit sandpaper. The covering will be ironed down onto the wood, so any irregularities in the wood will show through it. Before you start to cover, take the time to ensure that the wood is perfectly smooth and very clean. Now it is ready for covering



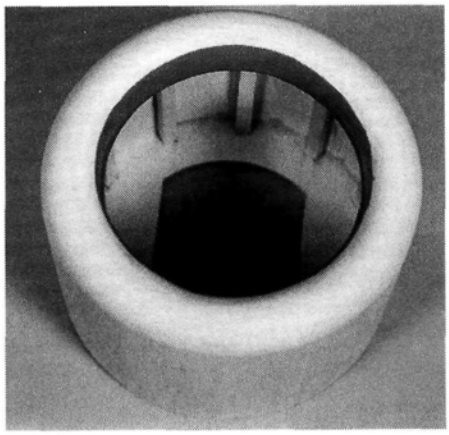
2 The inside surface of the nose ring is covered first. Tack the covering around the opening halfway between the front and the back of the ring, because the film will be stretched toward the forward opening and shrunk toward the rear opening. The front opening has a much larger diameter than the rear opening.



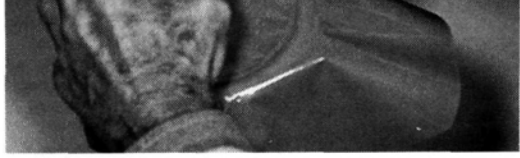
3 Several cuts have been made around front of the opening to relieve the tens on the covering. While heating the cov ing with a trim iron, pull and stretch it tow the forward opening. This is slow work; around the opening several times, sealing o about ⅛ inch each time. Making several pas ensures uniform coverage and prevents tear where the cuts have been made.



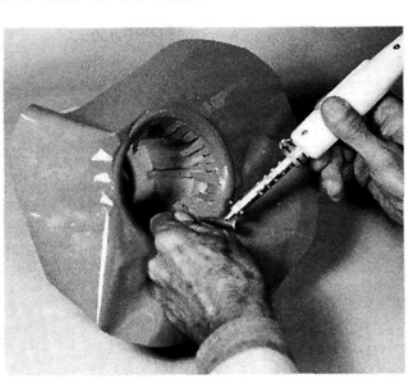
4 When the covering has been sealed as far forward as possible, work toward the rear opening. Before pressing the covering into place with the iron, shrink it with heat. If the cowl is large enough, reach in from the rear, and pull the covering into place. If the cowl is small, reach in from the front. Watch out for the heat iron! Working in small areas, it's easy to get burned. The rear edge of the opening is sealed and trimmed before the forward edge.



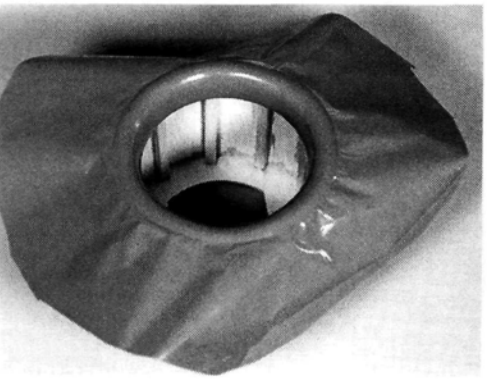
5 The forward edge of the opening is trimmed as straight as possible. Unfortunately, this has to be done freehand. Even if the cutting is a little crooked, the outer covering will hide the irregularities. After it has been cut, take care to seal the edge tightly; we want it to disappear under the seam.

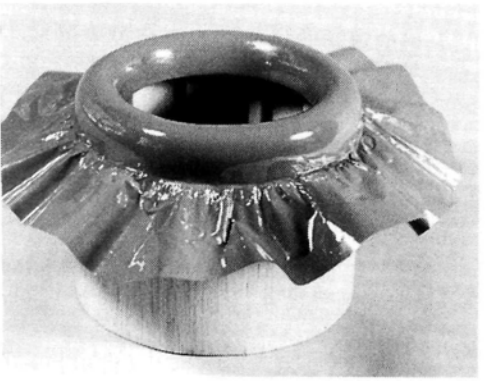


6 A circle of covering has been cut, leaving p ty of excess material. When stretching the c ering over the high part of the curve around nose ring, the excess gives you plenty to grip. Be working toward the inside of the opening. Put pressure on the film that's covering the open makes the film that's being heated stretch. Be slitting the covering, work as far inward as possi Once the covering has been sl relieve tension, it is vulnerabl tearing.

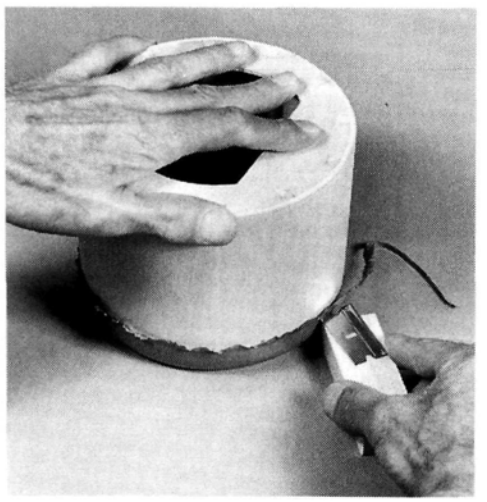


7 Eventually, the covering r be slit to form tabs with w you'll pull the covering place. Work slowly, and make eral passes around the open When this covering begins to o lap the inner covering, switch lower heat setting. Try to get a form seam about ⅛-inch wide. ⬅





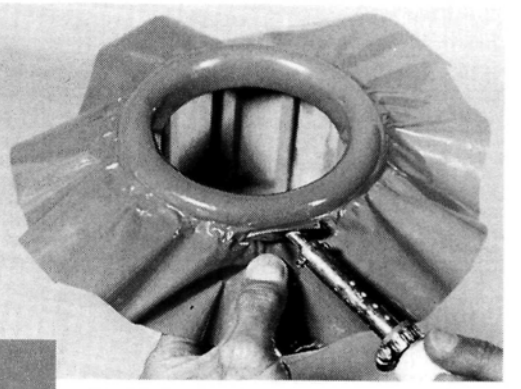
0 Working slowly, make several passes around the cowl up to the point where it is to be trimmed. In this particular e, that point is ⅛ inch beyond where the ve stops and the cowl flattens out. When the er part of the cowl has been covered, this ra ⅛ inch will form the underside of the m.

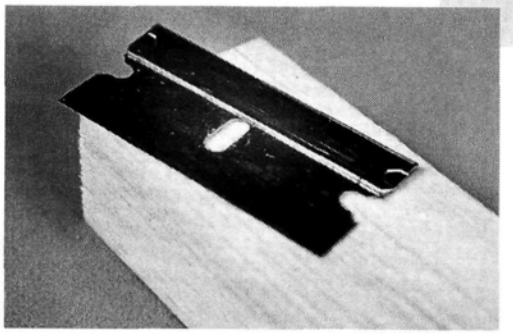


2 Place the cowl, forward edge down, on a flat surface—a *really* flat surface! Holding the tool at a slight angle to the l with the tip of the blade touching it, slowly te the cowl, cutting the covering as you do The cut should be just deep enough to cut ugh the covering and not into the wood. A scratch on the wood, however, won't hurt hing.

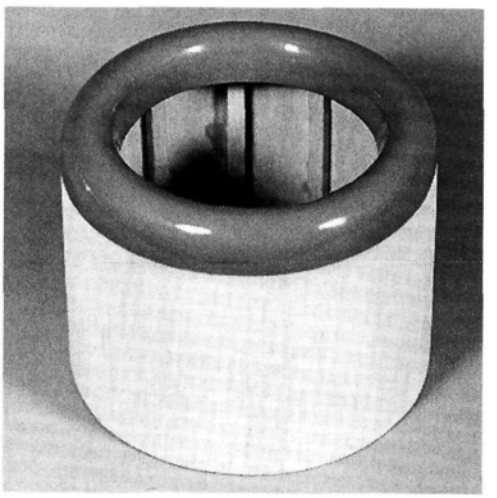
8 When you're satisfied that the overlapping covering is smoothly attached to the underlying film (the inner covering), make the trim cut. Once again, this is a free-hand cut that must be done carefully to avoid cutting through the underlying film. When you've finished cutting, remove the scrap. Using the low-temperature setting on the iron allows you to smooth the seam into place and remove the scrap easily. After trimming, go over the seam with the iron set at a high temperature to ensure a tight seal. ⬅

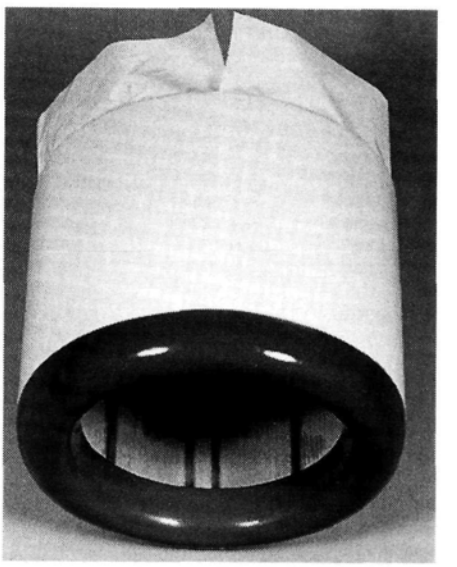
9 The outer rim of the cowl is covered in the same manner as the inner edge. The covering is heated and stretched over the rim and onto the outer surface of the cowl. Heating the covering with the side of the iron makes it rubbery and allows it to be stretched over the curve. ➡



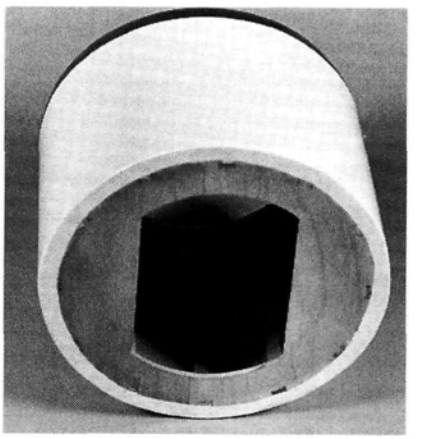


11 A simple trim tool is made to ensure a straight cut around the entire cowl. First, cut a block of scrap balsa as wide as the distance between the trim cut and the forward edge of the cowl. Glue a new, single-edge blade on the balsa with a couple of drops of CA. Only the tip of the blade should extend beyond the edge of the wood. ⬅





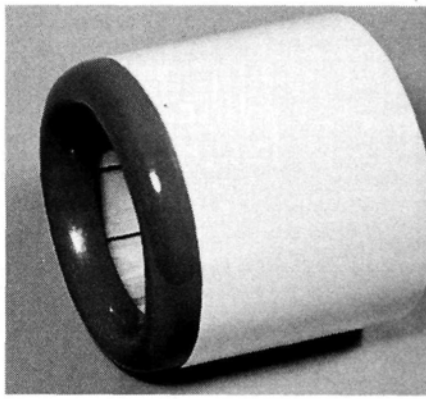
13 Stand back and admire what you have done! From here on, it gets much easier. Measure the circumference of the cowl with a flexible ruler, and cut a piece of covering a few inches longer (to allow for a seam). To provide enough covering for a tight seal on the rear of the cowl, cut the covering an inch wider than you really need. One of these long sides must be cut with a straightedge. It will be the edge that overlaps the nose-ring covering. If it is not straight, it will not look good.



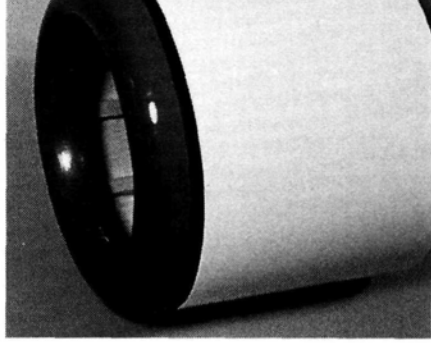
14 The covering has been wrapped around the cowl and "seamed down" to the center of the bottom side. The ¼-inch-wide seam is almost invisible; the clue to its location is the gap in the covering at the rear of the cowl.

15 Wrap the covering around the rear of the cowl, and seal it down using a hot iron.

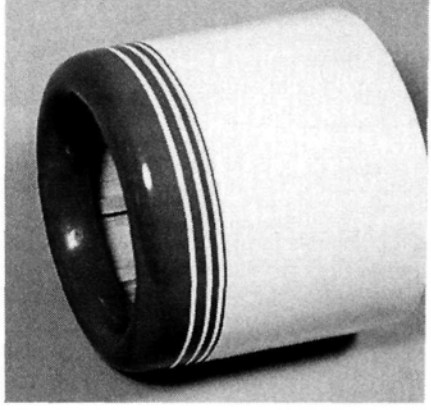
BUILD A RADIAL COWL



16 Except for a coat or two of seal (epoxy or finishing resin) on inside and on the back, this co is finished. When applying the sealant, sure to overlap the edges of the covering the front and back of the cowl. This a will probably be subjected to more f leakage than the rest of the aircraft.



17 Some people can't leave w enough alone; I guess I'm one them. I've added a trim line o contrasting color here. It gives the cow little pizzazz and could cover any boo-bo that were made while forming the se where the basic colors meet.



18 Here is a slightly more elabo trim scheme. Three stripes of color that was used for the n ring have been applied; and each strip thinner than the previous one. In this c the stripes are 3/16, 1/8 and 1/16 inch w These are just a few ideas to get y imagination going.

AIR SCOOP

by CHRIS CHIANELLI AND HIS LOYAL STAFF

EVERY OCTOBER, at the Radio Control Hobby Trade Association (RCHTA) sho in Rosemont, IL, hundreds of hobby manufacturers show their wares and announc new products for the coming year. Here's a sample of just some of the exciting new products we saw the latest show.

GOLDEN SKYLANE

This beautiful Cessna 182 Skylane is the latest addition to Top Flite's* Gold Edition series of scale kits. Like other Gold Edition kits, the 182 features precision-formed, CAD-engineered wooden parts that make up a straight, true, strong structure that's easy to assemble. The wing was developed using a state-of-the-art, 3-D, CAD program, so the fit is exceptionally accurate—so much so that the wing can be aligned on any flat work surface without a jig. Many precision-formed ABS parts, such as wheel pants, wing-strut fairings and simulated corrugation on flaps, ailerons and elevators, are included. Other prefabricated scale details are too numerous to mention here. Specifications: wingspan—81 inches; wing area—906 square inches; weight—10 to 12 pounds; engine required—.61 to .91 2-stroke or .91 to 1.20 4-stroke.

FIRST-TIME FLIER FRIENDLY

With the introduction of the Flying Start, Hobby Shack* may have redefined the meaning of ARF. Not only does the Flying Start come with a Magnum .15/ABC/FSR pull-start engine—doing away with the need for heavy starter, batteries and power panels—but the model also features bolt-together construction that requires only simple tools, such as screwdrivers and pliers. The flat-bottom, balsa-sheeted foam-core wings are factory assembled, as are the sheet-balsa tail feathers with pre-hinged control surfaces. Specifications: wingspan—52 inches; wing area—410 square inches; weight—48 ounces; radio required—3-channel. Contact Hobby Shack, 18480 Bandilier Cir., Fountain Valley, CA 92728-8610; (714) 962-0827.

PRO SERIES B-25

Wing Mfg.* showed its new Pro Series B-25 kit designed by master modeler Hal Parenti. Unlike Wing's economical shor kits, the Pro Series kits feature precision laser- and die-cu parts, foam-core wings and stab, formed cowls, canopies turrets, wing nacelle fairings, etc., a complete hardwar package, decals and full-size construction plans. The B-25's wingspan is 82 inches with 920 square inches of wing area; weight is between 12 and 15 pounds; and the Mitchell bomber can be powered by two .40 to .60 2-stroke or two .48 to .90 4-stroke engines. The kit i designed for retractable landing gear and flaps.

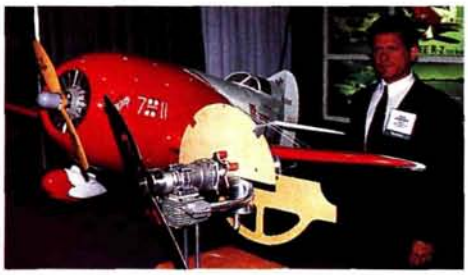
COX KATYDID

Larry Renger, chief designer at Cox*, shows off th Katydid—a plane that's as interesting as it is simple, ine pensive and easy to build. It comes covered and i designed for the Cox Dragonfly ½A engine (includes tanl clunk, exhaust throttle/muffler), but would be one littl screamer with the new Cox carbureted R/C ½A. Cox ha interesting plans for its R/C engine line; take a look at th photo behind Larry's right shoulder. Does the airframe hol ing the Tee Dee RC .09 look like a pattern ship?

EW PRODUCTS FOR '95 AT RCHTA

22-PERCENT-SCALE X-300 & THOMPSON TROPHY NEWS

Several new developments were in evidence at the Byron Originals* booth. A new 28-percent-scale X-300 has a color scheme based on Jene Soucy's famous aerobatic air-show exhibition plane. The 82.5-inch-span aircraft uses a G-62, but it will also fly with a w 47cc gas engine, tentatively named the "Mustang," which is said to offer rformance close to powerplants with larger displacements (we'll keep you sted). At right, Bruce Godbersen of Byron stands behind the Byron ee Bee, introduced as a ompson Trophy racer at lveston '94. Nearby is the 62 PurrrPow'r unit, first veloped for that Gee Bee. ore Thompson Trophy cers are planned by Byron. w, brightly colored fuel els on Byron fuels were o seen at the booth.



SWEET VEE ROCKET GLIDER

cket-powered R/C planes are still the rise. Dave Meyers shows Estes'* new Sweet Vee rocket-wered (D- and E-size engines), hannel, thermal duration glider. e kit features cut obechi sheeting, m-cores, a solid fiberglass om/fuselage and an Estes-signed plastic-molded mechanical ker for the V-tail, so you don't ed a programmable radio. The 55-h-span glider has 340 square nes of area, weighs 16 to 20 ounces and has a wing loading of 7 to 8 nces per square foot. Flights are said to average 5 to 12 minutes in mod-te conditions—much longer if you catch a thermal.

TANKING UP?

Jim Broberg of Du-Bro shows off Du-Bro's* new 32-, 40- and 50-ounce fuel tanks for larger aircraft. Also of note at their booth: Du-Bro's shock-absorbing motor mounts (a new, patented design) are now available for a wider range of engine sizes ranging from .25 to 1.80 2-strokers.

ALL-AMERICAN DAD

Dave Abbe, Fred Marks, Tim Marks and Dan Abbe have joined forces (combining more than 100 years of RF model design experience) under the aegis of Design & Development Inc.* (DAD) to produce some ingenious, forward-looking, high-performance radio equipment. DAD's $79.95 Interceptor 2,000 receiver (see inset) has been billed as the first R/C receiver to break the "FCC 1999 technology cost barrier." The unit has a lifetime warranty that's supported nationwide by 35 authorized service stations. It uses mil-spec, U.S.-made RF parts to reduce spurious RF emissions by a factor of 40,000, thus meeting 1999 FCC standards. The unit's "stealthy" components are said to improve the selectivity of the R/C uplink by a factor of 10 to 100.

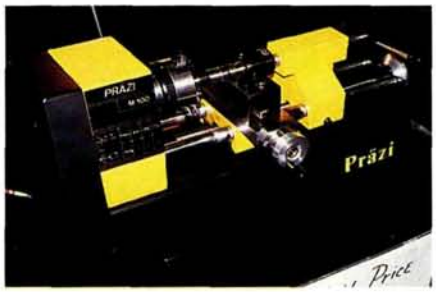
Who are the principals? Fred Marks is a former chairman of the AMA frequency committee, a lifetime modeler and, for 23 years, a designer of Ace R/C radios. Dave Abbe, a founder of RCD, is a lifetime modeler with a lengthy history in electronics. Tim and Dan have made significant contributions as well, and now the latest products are beginning to roll out. These include the $99.95 RP400 super AC/DC battery charger (peak-charges two to 10 cells), and the Plug'r adapter that solves plug compatibility problems when you're charging flight packs. In keeping with DAD's iconoclastic style, the company has also announced the "release" of more than 1,000 dealers who offer DAD receivers, servos, wiring and chargers at "below mail-order discount prices." To find the nearest "Made in the USA" hobby dealer, look for the DAD sign at your local dealer, or call (800) 669-4548.

SIG KADET LT-40 TRAINER

Shown off by Barbara Pratt, Sig's* new Kadet LT-40 trainer continues a legend Designed by Mike Gretz, the LT-40 has a large 70-inch wingspan, adequate dihedra and full-house 4-channel functions. Positive stability and true hands-off recovery make the new Kadet LT-40 a great trainer. The kit has an easy-to-build, interlocking lite-ply fuselage, computer-generated plans and a comprehensive, photo-illustrated instruction manual. The complete kit includes engine mounts, wheels, spinner, fuel tank, pushrods and all the nuts, bolts and screws to get you in the air fast. Specifications: wing area—900 square inches; weight—5.5 to 6 pounds; wing loading—14 to 15.5 ounces per square foot; kit no. RC-67.

LANIER LASER NOW IN 1/3-SCALE

Following the fantastic success of their ¼-scale Laser (held by Bubba Spivey) and the other giant-scale winners in their Stinger series, Lanier RC* has now added a ⅓-scale craft to the Laser lineup (at top). Designed by Bob Godfrey—the 1990, 1992 and 1994 TOC winner—the new Laser features Lanier's famous formed-ABS fuselage top (which drastically reduces building/sanding time) and the proven open-bay foam/balsa wing, which is strong and light. Specifications: wingspan—96 inches; wing area—1,596 square inches; weight—18 to 22 pounds; engine required—3.2ci to 4.2ci gas ignition (a Zenoah G62 would be perfect!). For information, contact Lanier RC, P.O. Box 458, Oakwood, GA, 30566; (404) 532-6401.



PRAZI PRECISION LATHE

Industrial precision is now a reality for home workshops with the Prazi* M100 metal-turning lathe. For modelers who want to make engine parts, retracts and other items that require close tolerances, the German-made M100 is a godsend at a very reasonable price. Prazi offers a complete line of machine-shop tools and machines, and all are well-suited to serious modelers.

F-14 TAMECAT TRAINER

Altech Marketing* introduced their new, almost-ready-to cover F-14 Tamecat Traine designed by Jeff Troy. This appealing jet-like sport mode has trainer-like flight perfor mance. The highly fabricated kit has a sheeted, flat-bottom foam wing and jig-built fuse lage parts that can be covered in less than two hours. Designed for .40 2-stroke engines, the lightly loaded Tamecat has a 72.25-inch wingspan and 794 square inches of wing area. Its ready-to-fly weight (without fuel) is 6.5 pounds. Also included in the kit are military-style decals, molded-ABS wingtips, a cockpit deck, an engine cowl and a clear molded canopy.

Also on display was the new Enya .41 4-stroke engine. Approximately 1 ounce lighter than the popular Enya .53 4-stroke, it includes a new crankcase desig and a new front housing. The engine comes with a muffler and the same GC-type carl used on the .53 4-stroke engine. More specs are on the way for this one.

GMS of ISC

In a quest to make the "perfect model airplane glow engine," ISC's Jim Goad Sr. has joined accomplished modeler and businessman Mr. Mui, who will be producing the new powerplants in China. The new GMS line of 2-stroke engines will include: one-piece crankcases cast out of the material used to make full-size aluminum auto crankcases; three-needle carburator; conrods machined out of bar-stock; two-piece button cylinder head; semi-hemispherical combustion chamber; and large-diameter, 5/16-inch crankshaft. The engines pictured here (a .40 and a .47) are the last of the prototypes that have been developed over the past two years. Jim Sr. and Mr. Mui are confident that the design goals of high performance, reliablilty and durability have been met. The .40 prototype is reported to turn a 10x6 at 14,000rpm with an open exhaust.

ROYAL-AIR 40H CESSNA

This scale-looking Cessna is the new Royal-Air* 40H from Royal Products Corp. The Cessna comes 90-percent factory-assembled of balsa and plywood, and it features painted, polyester film covering with a scale paint scheme on *both* sides of the wing and stab. Amenities include a superbly detailed construction manual and dual-strut, torsion-style main landing gear with attractive molded wheel pants. The Cessna has a wingspan of 62½ inches, and the recommended engine is a .40 to .46 2-stroke or a .50 4-stroke.

SHORT BLAST R/C HOT AIR BALLOON

This 22-foot-high, 35-pound, R/C hot air balloon comes from New Mexico inventor Bruce Purdy and his partner Danny Garcia. The Short Blast uses Coleman camp stove propane to heat the air inside the envelope, and features a hand-built, anodized-aluminum frame with polystyrene sides and a two-stick Futaba radio system. The Short Blast is capable of controlled free-flight, but tethered flight is recommended for safety (a tether reel is included). For information, contact Short Blast Radio Control Hot Air Balloons*, P.O. Box 75336, Albuquerque, NM; (505) 836-7444.

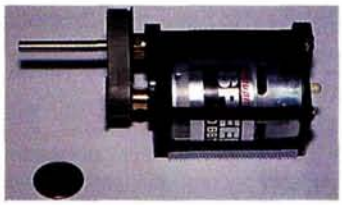
NEW TRAINER LINE, UPDATED TIGER STICK

Thunder Tiger* unveiled two new ARF trainers to go with its hot Tiger Trainer 40 (shown here being held by Thunder Tiger USA's executive vice president Steve Ellison). The first is the TT 25 (below)—a built and covered plane that's designed to be easier to transport and can be flown in smaller areas (its wingspan is only 50 inches). The TT 60 (bottom) has a 72-inch wingspan and is also built by Thunder Tiger's factory craftsmen. The 60 features a complete hardware and accessory package that provides everything from a spinner to clevises. Both trainers require 4-channel radios and don't include engines.

Thunder Tiger also displayed an updated and re-trimmed version of its Tiger Stick—a 40-size ARF sport-trainer aircraft with a 59-inch wingspan. The plane comes built of balsa and includes a complete accessory package with wheels, tank, spinner, pushrods and hardware.

GEARING UP

Hobby Lobby*, always known for its diverse and interesting product line, again surprised the crowds with new offerings from Europe. The big story was gear-reduction systems—double output gears, planetary gears, belt reduction drives, etc.—for a large variety of electric motors. These systems allow motors to spin bigger props with authority. Hobby Lobby's new 99-inch-span trainer, the PS Flyer, uses a "powerful and ridiculously cheap" Graupner Power Gear and Turbo 700 motor (shown below). Looking for raw power? The new motor (shown above)—the 700W, 24-cell Ultra 3500—is said to achieve 88-percent efficiency by virtue of its movable, self-adjusting (self-timing) stator ring. For more info on these and other new offerings, order the Hobby Lobby catalogue (no. 24) by calling (615) 373-1444; fax (615) 377-6948.

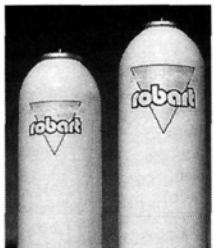


LMH-100 HELICOPTER

According to Lite Machine Corp.* president Paul Arlton (pictured), the company's LMH-100 is the first mass-produced, ½A-class helicopter in the world. The LMH-100 was one of the stars of the show, mostly owing to its patented Arlton Gyro stabilizer (this eliminates the need for an electronic gyro) and its injection-molded rotor blades that fold up to avoid being damaged in a crash. The main rotor head features full Bell-Hiller control with dual mix ratios and Lite Machine's patented Subrotor—a one piece, aerodynamically balanced stabilizing rotor (which also minimizes reversed airflow around the rotor head). The main blades are cambered, twisted and tapered, and their pitch can be adjusted using various blade grips. The LMH-100's fuselage is made of CNC-routed and keyed plywood that's covered with a molded, fuelproof canopy, and it's designed to fly with standard Cox TD .049 or .051 engines. It's priced at just around $200, without engine and control systems. Call (317) 463-0959.

METAL AIR TANKS IN TWO SIZES

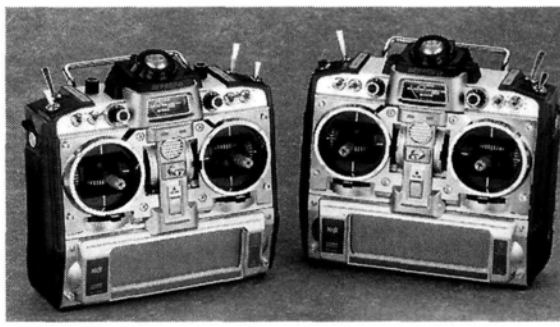
Robart* now offers medium (no. 191) and large (no. 192) aluminum air tanks for giant-scale models. These tanks have been extensively tested and, according to Robart, are safe for pressures up to 150psi. The medium tank (30ci) measures 2 1/4 x 8 inches: the large (43ci) measures 2 5/8 x 9 3/8 inches.



These lightweight tanks—2 ounces (medium), 3.2 ounces (large)—list for $10.95 and $12.95 respectively. Contact Robart, Box 1247, St. Charles, IL 60174; (708) 584-7616; fax (708) 584-3712.

MIDWEST EXTRA 300 COCKPIT DETAILS

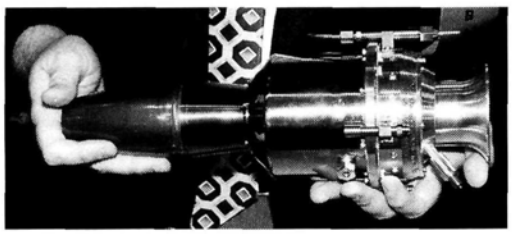
This new instrument-panel kit goes with Midwest's* new 1.20-size Extra 300S kit. Just glue this ready-made cockpit accessory into place—no assembly required. It looks good and has fine details, such as a flight-diagram clipboard, switches, knobs and instrument faces. It can be a nice addition to your model's main office.



JR PCM 10SX

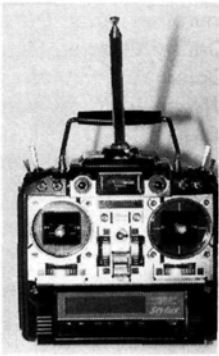
JR Remote Control's* newest top-of-the-line, state-of-the-art radio is the JR PCM-10SX. It's available in heli and aircraft configurations. By consulting Curtis Youngblood (heli champ) and Chip Hyde (acrobatic champ), JR has ensured that the new 10SX radio has a host of new and powerful additions: four flight modes that feature independently adjustable stunt trim; revo-mix and gyro sensitivity;and four of the eight programmable mixes are multi-point programmable for linear or curved responses. For fixed-wing fliers, the 10SX features multi-point curve options on three of its programmable mixes, zero to 100-percent trim rates, servo-speed programmability and single-switch, three-axis rate selectivity. For discriminating heli and airplane pilots, the JR PCM 10SX has it all.

J450 JET ENGINE/STYLUS RADIO



Airtronics* shocked many show-goers by unveiling its new J450 turbine engine. Weighing in at just under 4 pounds without a fuel system, the new Airtronics turbine is 14.4 inches long and 4.8 inches in diameter, and it puts out 11 pounds of thrust at 123,000rpm. The J450 is started by compressed air and runs on JP-4 fuel instead of propane.

Also in the Airtronics booth was a new 8-channel radio system called the "Stylus." Suitable for use with all high-performance aircraft, sailplanes and helicopters, the Stylus features a new, custom 1024 PCM system that allows it to process control information at a super-high speed.

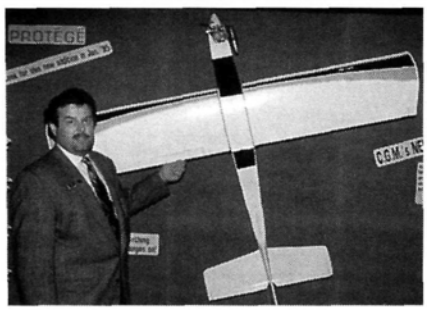


HITEC DELIVERS!

It's Mr. Chun Park, president of Hitec*. Chun is very happy to announce that the new Flash 5 computer radio is ready for shipment. I know I've mentioned this system before, but there have been a few minor delays. Delays are common when new products are being brought to the market, especially products that are as cost-effective as the new Flash 5. Think of it: a two-model-memory radio with the most popular computer features—all for about $170! Did I mention that it comes with the Hitec RCD Supreme 8-channel receiver? Wait till you hear what number-one idiot (yours truly) got away with using one of these receivers: I flew my giant-scale Musketeer without uncoiling the antenna! I flew all weekend that way without a glitch (and you can get a 96-inch-span plane *very* far away from you). Imagine my embarrassment when I discovered my dumb mistake. And I've been doing this for 23 years! Anyway, that's quite a testament to superb receiver design. I'll soon be reviewing the Altech Musketeer in *Model Airplane News;* then you'll get full details and see the incriminating photos that show my stupidity. I guess it happens to everyone. Doesn't it?

HOW FAST?

Hobbytech's* onboard air-speed indicator measures the highest air speed achieved by your model, then reports the info to you after you have landed. Just plug in your expanded-scale voltmeter, and use the provided chart to convert voltage to mph. For more information on this innovative piece of equipment, call (708) 695-5903.



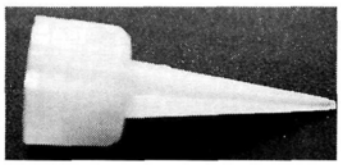
CGM PROTEGE 60 TRAINER

Carl Goldberg Model's* new .60-size trainer just about dwarfs employee Art Pesch. The Protege has a 71½-inch wingspan, 895 square inches of area and weighs 6½ to 7⅓ pounds all-up. It uses two servos for aileron control (probably in deference to the new line of low-cost, high-capability radios now emerging).

FROM RUSSIA WITH THERMALS

Hobby & Tool of America* offers the Spirit sailplane—a fully composite F3B/F3E glider—that's made in Russia, which means that it can be purchased at an attractive price. Features include a white gel-coated "seamless" glass/carbon/Kevlar/epoxy fuselage; a three-piece composite (hollow shell) wing; four wing servo wells; choice of conventional or T-tail; and a RG-15 airfoil—all for an introductory price of $549.95. Hobby & Tool is also the U.S. distributor of Minicraft Precision Power tools, a diverse line of small but capable tools for modelers who need to make the most of their space. For further information, call (908) 281-5544.

STICK TO THE SUBJECT



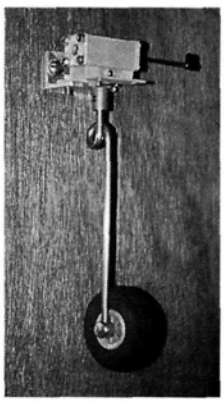
Bob Smith Industries*, one of the major adhesive manufacturers, announced a new Freon-free accelerator formula that doesn't attack white foam or clear plastic and a new, internally tapered glue tip (shown) made of glue-resistant plastic that resists becoming plugged.

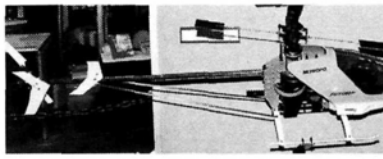
FUTABA 6VH AND 6VA PROGRAMMABLE RADIOS

Futaba* announced two new programmable FM radios to replace the Conquest 6-channel. The 6VA, for aircraft, has a suggested retail price of $349.95; the 6VH heli version will retail for $399.95. The 6VA will offer two dual rates, elevator/flap and flaperon mixing, AST (four channels or two channels with throttle ATV), proportional flap knob, retract switch and servo-reversing. The helicopter version (shown) includes idle-up 1, throttle hold, hover-pitch adjust, revolution mixing, pitch-curve adjust and other features

CENTURY JET RETRACTS

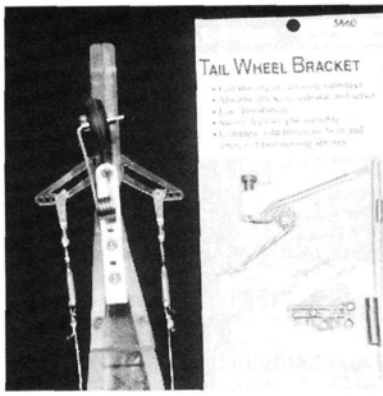
Century Jet Models Inc.'s* display of retracts was impressive; it included their new 90-degree rotating unit for .60- to 1.20-size models and their new mechanical FAI retracts. The air-driven rotating gear are perfect for P-40s, Corsairs, Hellcats and Skyraiders up to 15 pounds and include positive up-and-down locks and functional Oleo struts. The FAI pattern retracts are furnished with 3/16-inch-diameter wire gear for pattern models weighing up to 15 pounds, and the retract direction is reversible to suit the modeler's specific installation requirements. The mechanical gear can also be converted to air operation with simple conversion accessories. Other new items include a large 32ci storage tank, and an even larger—43ci—tank to handle the needs of giant-scale enthusiasts is in the works.





REDESIGNED FUTURA HELI

Robbe* products are now distribu in this country by venerable sc and sport kit manufacturer P Enterprises. Shown here is the new Schlüter Futura helicopter, wh has been redesigned to incorpor performance-enhancing modificati specifically developed by Cu Youngblood—a Robbe-sponsor world-renowned heli pilot. For m information on the Futura heli, or the broad line of Robbe model planes, helicopters and accessori contact Pica/Robbe at (305) 9 1575; fax 937-2322.



ATTENTION ALL TAIL-DRAGGER

Sullivan* products wishes you hap landings and claims you'll get th with their new steerable tail-wh bracket. Available in three si for models from 2 to 22 pounds. new bracket absorbs ground bu and minimizes the likelihood of frame and rudder-servo damage absorbing shock. According to Sulli what really sets it apart are its neatness and ease of installation. Just two bolts and you're in business! It comes with two sets of shock springs, so can choose how hard or soft you it to steer. For more information, tact Sullivan Products, P.O. Box 5 Baltimore, MD 21224.

*For addresses, see page 127.

AstroFlight News

Astro Dominates APBA Electric Nationals

June 26, Tacoma Washington

Team Astro Cobalt Racing Motors dominated the third Annual APBA Electric Boat Nationals held in Tacoma, Washington on June 26. Seven out of eight first place trophies were won by Astro powered boats. Astro's new SUPER-HOT FOUR-TURN marine motors powered a number of winners. These two new motors deliver peak horsepower at 25,000 RPM. They are now available as Model #306 (05-size for 7 and 8 cells) and Model #326 (25-size for 12 cells).

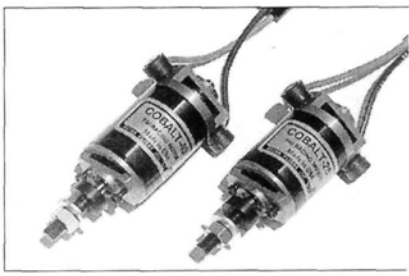
Bob and Suzanne Boucher enjoying the actio at the APBA/DPI Leisure Sports Nationals.

EVENT	*PLACE*	*DRIVER*	*BOAT*	*MOTOR*
1/16 Scale Unlimited	*1st*	*Bob Welch*	*DPI American Dream*	*Astro #306*
7-Cell Open Hydro	*1st*	*Bob Welch*	*DPI American Dream*	*Astro #306*
7-Cell Open Hydro	*3rd*	*Jeff Vasquez*	*Electrolite*	*Astro #306*
12-Cell Open Mono	*1st*	*Greg Schweers*	*Black Diamond*	*Astro #305*
12-Cell Open Mono	*2nd*	*Mark Walburn*	*Graupner Monster V*	*Astro #305*
12-Cell Open Hydro	*1st*	*Jeff Vasquez*	*Jeff's Rigger*	*Astro #325*
12-Cell Open Hydro	*3rd*	*Mark Yordy*	*Fastoy's Rigger*	*Astro #325*
12-Cell Sport Hydro	*1st*	*Bruce Mooring*	*D.F. Oberto*	*Astro #325*
12-Cell Sport Hydro	*3rd*	*Ross Hatte*	*Hatte Custom*	*Astro #325*
12-Cell Open Tunnel	*1st*	*David Carriker*	*Schweers Tunnel*	*Astro #305*
12-Cell Open Tunnel	*2nd*	*John Starks*	*Stark's PMP Tunnel*	*Astro #325*
12-Cell Open Tunnel	*3rd*	*Paul Dunlap*	*DPI Tunnel*	*Astro #325*
Anything Goes	*1st*	*Jeff Vasquez*	*Jeff's Rigger*	*Astro #325*
Anything Goes	*2nd*	*Ray Hernandez*	*MRP Fountain*	*Astro #340*
Anything Goes	*3rd*	*Randy Naylor*	*Blew By You*	*Astro #325*

New Super-Hot FIVE TURN Competition Airplane Motor

Astro reveals its new Five Turn Comp series of Cobalt airplane motors. T motors have been totally redesigned for ***maximum power*** at ***minimum weight.*** T field ring that houses the Cobalt magnets been eliptically machined to remove as n weight as possible *without* sacrificing an magnetic field strength. The machined aluminum endbells have a new open desi maximum air-cooling and minimum wei New silver **LAY-DOWN** brushes can sa handle up to 75 amps current draw witho sparking and brush life has been greatly increased.

These new Astro Elliptical Motors will ***rings around the competition!***



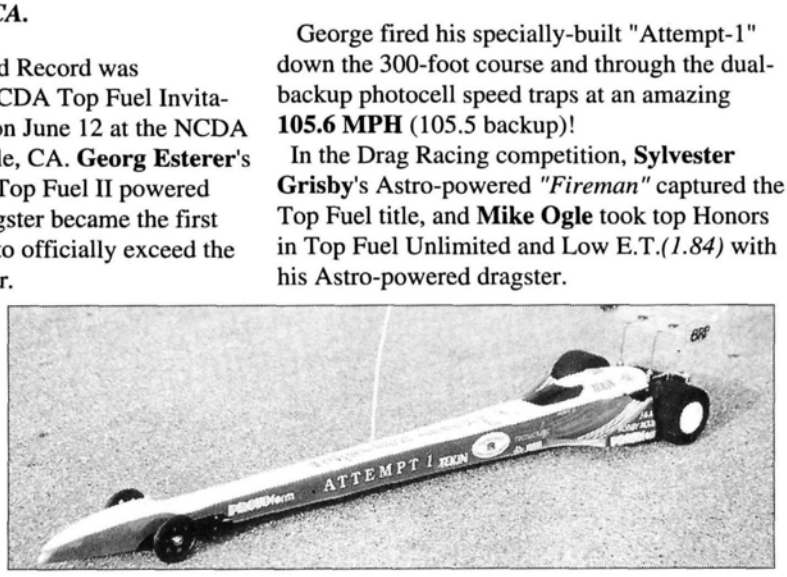
FASTEST R/C Car in the WORLD... 105.6 MPH!

June 12, Sunnyvale, CA.

The R/C Land Speed Record was shattered at the first NCDA Top Fuel Invitational drag race held on June 12 at the NCDA Speedway in Sunnyvale, CA. **Georg Esterer**'s history-making Astro Top Fuel II powered Lightz-ProtoForm dragster became the first wheel-driven R/C car to officially exceed the 100 MPH speed barrier.

George fired his specially-built "Attempt-1" down the 300-foot course and through the dual-backup photocell speed traps at an amazing **105.6 MPH** (105.5 backup)!

In the Drag Racing competition, **Sylvester Grisby**'s Astro-powered *"Fireman"* captured the Top Fuel title, and **Mike Ogle** took top Honors in Top Fuel Unlimited and Low E.T.*(1.84)* with his Astro-powered dragster.



Georg Esterer's Astro Powered "Attempt 1"

COMING SOON:

• *The "Electric Motor Han book" by Bob Boucher...*

This all-new book tells you the Why, What, How of Electric motor theory and practice. book reveals the secrets of motor building a tells you how to get the most from your mot The Handbook topics covered include: calc speed and torque, determining motor const timing for sparkless commutation, propelle selection, and gearing. Mechanical drawin performance curves for all Astro Motors ar included. A MUST for the hi-tech racer!

• *New Digital Speed Cont*

Astro has joined the digital revolution, and soon release its first electronic speed contr incorporating its new proprietary ***Astro 20 computer chip****. These new high-rate contro be smaller in size and lighter in weight, hav higher efficiency, and will be* ***more afforda*** *than any other digital speed controls now o market.*

For more information, see your hobby dealer or call AstroFlight directly at (310) 821-6242.

Astro Flight, Inc. • 13311 Beach Ave., Marina Del Rey, CA 90292

PILOT PROJECTS

A LOOK AT WHAT OUR READERS ARE DOING

SEND IN YOUR SNAPSHOTS

Model Airplane News is your magazine and, as always, we encourage reader participation. In "Pilot Projects," we feature pictures from you—our readers. Both color slides and color prints are acceptable.

All photos used in this section will be eligible for a grand prize of $500, to be awarded at the end of 1995. The winner will be chosen from all entries published, so get a photo or two, plus a brief description, and send them in!

Send those pictures to: Pilot Projects, Model Airplane News, 251 Danbury Rd., Wilton, CT 06897.

WHEN DO WE TAKE OFF?

Bermy Nilssun of Zinköping, Sweden, sent this picture of his "pojk" Fredrik sitting on the nose of a P-51 ¼-scale Mustang. We think that this pilot and plane are well-suited and, although we don't know enough Swedish to translate the rest of Bermy's letter, we agree that you're never too young to dream about flying.

WELCOME BACK

After a 55-year hiatus from R/C, Bill Hoffman, of Newport, RI, built this Sig Kadet Sr. and modified it by giving the wing flaperons, tapering the trailing edge to prevent tip-stalling at low speeds and reducing the dihedral to 2 degrees. An experimenter by nature, Bill also installed a Dave Abbe computer—MOM (he programmed it to control the flaperons); an onboard battery monitor; landing lights; and a strobe light (in the fuselage). Bill says that the model weighs 14 pounds and flies "as smooth as silk."

DUTCH TREAT

Martin Klaassen of Albergen, Netherlands, sent us this photo of his friend's 70-inch-span DHC Chipmunk. Gerrit Terriet, who lives in Enschede, Netherlands, scratch-built the model out of balsa following Brian Taylor plans. The Chipmunk is powered by a .91 2-stroke SC engine and is covered with Oracover. It's a great-looking plane, Gerrit; we're glad your friend, Martin, shared it with us.

FLUTTERBY

K.C. Tsang of Chuan Park, Singapore, sent this photo of his Astro Flight Old Viking. He says that he liked the framework so much that he decided to show it off by covering the plane with transparent MonoKote. Powered by a Yokomo twin turbo 360 ferrite motor running on a Sanyo 6-cell battery pack, the Viking has run times of 20 to 23 minutes.

OLYMPIC AIRWAYS

This 83-inch-span Royal DC3 model looks as if it's ready for boarding. Yiannis Papadopoulos, a member of the Aeromodeling Club of Kavala, Greece, says that he equipped the craft with a SuperTigre 34 that turns two, 3-blade 10x4 Tornado props at 12,000rpm. The 10-pound model has functional flaps and retracts, and Yiannis reports that it flies in a realistic manner.

PILOT PROJECTS

ARGENTINEAN TRIO

A crew from Buenos Aires—left to right: Carlos Darnay, Fernando Lopez and Daniel Ventura—scratch-built this Mitchell B25-J following Nick Ziroli plans. Controlled by a 10-channel JR radio, the bomber has operable landing gear, retracts, brakes, bomb release, bomb-release doors and beacon and landing lights; and it's powered by two Zenoah 23cc gas engines. From the looks of all its scale machine guns, any R/C Japanese Zero would have a hard time shooting this Mitchell down.

GIANT-SCALE GUPPY

This unusual model is a rendition of AeroSpacelines 377 SGT (Super Guppy Turbine). Dan Savage and his brother, Daren, designed the model using a 1/144-scale Revell plastic model and a DesignCAD 3D computer program. Made of balsa and plywood and covered with chrome and silver Super MonoKote, the 88-inch-span Guppy has an 83-inch-long fuselage and weighs only 13 pounds. Dan and Daren tell us that the model has had four flights to date. We wonder what the birds think!

OLD-TIME RACING WINGS

S.B. Steincamp says that his scratch-built Roscoe Turner Special flies as well as the full-size original, which won the Cleveland Races twice—in '38 and '39. The 54-inch-span model is powered by an O.S. Max 91 engine turning a Master Airscrew 12x8 prop, and S.B. covered it with Solartex and K&B epoxy paint. This racer looks like a winner to us!

BUSH PILOT'S DELIGHT

Sam Henninger flies this 1/4-scale Sig Piper J-3 Cub off his boat dock at his home in Friendsville, TN. Powered by an Enya 1.20 engine, the model is controlled by an updated Futaba AM Gold Series radio; it's covered with MonoKote and has Vinylwrite custom lettering. Sam tells us that he took the photos while standing "up to his ears" in water; we hope that his camera has dried out by now!

MUSTANG CHAMP

This Dyna Flite .60 fun-scale Mustang was built by Malcolm Richards of Whangarei, New Zealand. It's powered by a "pleasantly quiet" O.S. FSR60 that's rubber-mounted on beam mounts, and it has an enlarged muffler that has a baffle and internally perforated exit tube. Malcolm says that the model was put through the Sportsman Pattern while in the hands of the New Zealand aerobatic champion, and it performed as well as any purpose-built pattern aircraft.

CURIOUS CANARD

Tony Newsom scratch-built this model from his own plans. He says that he first plugged numbers into a Lotus spreadsheet—one that he'd formatted with mathematical formulas that would calculate the dimensions and distances for the surfaces—and then used AutoCAD to make the drawings. Constructed of balsa, foam and plywood and covered with Ultracote Plus, the 51-inch-span model weighs 4 pounds, 14 ounces. Tony says that its tricycle-gear retracts with a nosewheel door make the plane very clean after takeoff and contribute to its top flight speed of 95mph. We're sure it must turn a lot of heads at the flying field!

CONSTRUCTION

Easy-to-build 60-size British warbird

The Spitfire is an excellent flier. Its low wing loading makes it very maneuverable.

Spitfire Mk VIII

by ROY DAY

IT'S HARD TO find anyone who doesn't admire the graceful lines of the Spitfire with its elliptical wing planform and its long, slender fuselage. In addition, the Spitfire is world-famous for its role (along with the Hurricane) in the Battle of Britain.

Here is a .60-size sport-scale Spitfire that's accurate in outline but retains the simplicity of fixed gear. The plane was based on three-views obtained from Fred W. Spring* of Australia. He has a large number of excellent three-views, mostly of British airplanes. The model only weighs 6½ pounds, which gives it a comfortable wing loading of only 21 ounces per square foot. It's a pleasure to fly low or high speeds, it's very stable, and it's capable of all mane vers. Let's get on with t construction.

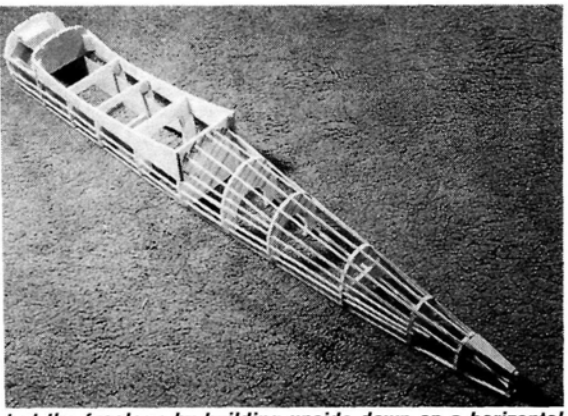
WING CONSTRUCTION

Whatever type of constru tion is used, an ellipti wing is a little more dif cult to build than a strai tapered wing. However, technique I used in co structing the foam wing pretty simple. If you don't have a hot-wire cutting rig, enlist help of a fellow modeler who does, or send your wing specs t commercial outfit, such as RA Cores*. My friend Ron Bozzon

Rollout will be straight with no danger of ground looping. It looks very scale-like as it makes its landing rollout with the tail held high.

ut the foam panels for me. The left and ght wings are each composed of two pered panels cut from 3-inch-thick white oam (available from building suppliers). imensions of the panels are given on the lans. Make the cut at the wing root (R1) 6 degrees, which will give the correct ihedral when you later join the left and ght wing panels.

Next, you're ready to hot-wire the air-oil shape of each panel. I used a NACA 415 airfoil—one of my favorites. You'll eed three templates: R1, R2 and R3. Note



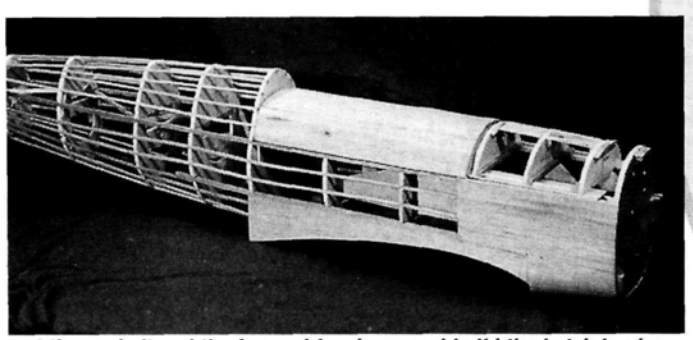
tart the fuselage by building upside down on a horizontal rutch.

e airfoil templates are longer (chordwise) an the cut foam panels; this allows for e addition of the leading and trailing lges to form the elliptical shape. Make e airfoil templates from aircraft-grade ywood, sheet aluminum or phenolic, hich is what I used. Whatever you use, ake sure the edges are very smooth so at the hot wire won't hang up as it passes er the template. Attach the template R2 the inboard foam blank so that R2 is 1 gree nose-down relative to R1. This will ve 1 degree of wing twist (washout) at 2. When you're ready to cut the outboard ank, set R3 1 degree nose-down relative R2. When you later epoxy the two pan-s together, this will give a total washout the tip of 2 degrees. This amount of ashout has proven adequate to ensure a gentle, straight-ahead stall—no tip stall. Incidentally, the full-scale airplane had 2½ degrees of washout.

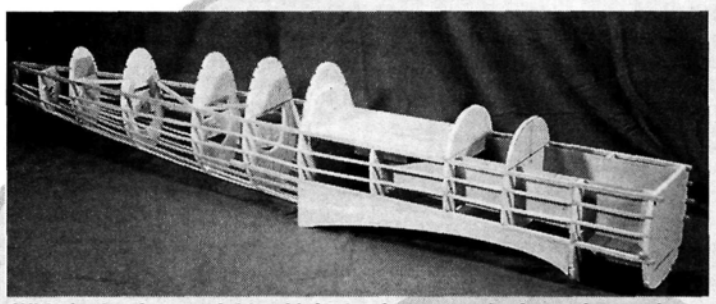
Reinforce each wing panel with 1-inch-wide filament strapping tape on the top and bottom at about the ¼-chord point. Next, to protect the thin foam edge of the wing panels from handling damage, add the tip and leading-edge sheeting. I used Dave Brown's* Sorghum contact cement to attach the 1/16-inch-thick sheeting. From the plan, make a template, which you can use to shape the trailing-edge sheeting to the elliptical wing shape.

Use a Dremel tool or a hot wire to route a channel for your aileron control cables. To cut out the channel, I used some bare no. 12 copper wire (bent to the desired shape) in my soldering gun. Similarly, make cut-outs for the landing-gear blocks, the plywood false ribs and the aileron servo. The false ribs provide a lot of strength and prevent the landing gear from being wrenched out of the foam on a hard landing. Reinforce the wing hold-down-bolt location with plywood. Now add the bottom sheeting and the remaining leading-edge laminations, and shape them to give the elliptical form. Cut out the ailerons, and face them with 1/8-inch-thick balsa sheet.

Depending on the type of hinges you use, you may need to add some reinforcement blocks at this point. I use covering material for hinges, so I don't need to add any. Install the wingtips, and then join the wing halves with epoxy, checking to make sure that you have the 6 degrees of dihedral. Reinforce the wing center section with two layers of 3-ounce fiberglass cloth as shown on the plan. The wing loads are carried by the sheeting and the fiberglass; there is no requirement for a wing joiner brace. This completes the wing construction.



eet the cockpit and the forward fuselage, and build the hatch in place. wl mounting blocks are epoxied onto the firewall.



With the fuselage upright, add the top formers and a few stringers. Leave room to put in the control rods before closing up the fuselage with the remaining stringers.

SPECIFICATIONS

Name: Spitfire Mk VIII
Type: Sport scale
Wingspan: 64 in.
Weight: 6½ lb.
Wing loading: 21 oz. per sq. ft.
No. of channels req'd: 4 (throttle, elevator, rudder, ailerons)
Airfoil: NACA 2415 (semisymmetrical) with 2 degrees of washout
Wing material: Foam with balsa sheeting
Fuselage: Built-up with foam-board formers
Engine: 60 2-stroke; 65 to 70 4-stroke

FUSELAGE CONSTRUCTION

Build the fuselage on a horizontal crutch, upside-down on the plans. I used 3/16-inch-thick foam board for all of the formers. Foam board is a sandwich of white foam between card stock. It's equivalent to light balsa, weighing only 7.6 ounces per cubic foot. Foam board can be cut using an X-Acto knife or a scroll saw, and its sandwich construction makes it resistant to splitting. Use white glue or foam-compatible CA with the foam board. It comes in sheets about 18x20 inches or larger, and it can be purchased in several thicknesses from art-supply stores.

Glue in the 3/16-inch-square longerons and the wing saddle. Install the 1/32-inch-thick plywood doubler inside the forward fuselage, and reinforce with triangular stock as shown on the plans. Next, put in a few of the 1/8-inch-square stringers, but leave plenty of space so you can install the rudder and elevator pushrods and a tube to run the antenna to the tail area. I used the Nyrod-type of pushrods so there was no need to cut out the centers of the formers. If you use other types, cut out the formers to provide space.

FLIGHT PERFORMANCE

• Takeoff and landing

With its wide-tread landing gear and long fuselage, the Spitfire has good ground handling characteristics. On the first flight, however, I noticed that it was light in the tail during taxiing. It also pitched up on its nose on landing, so I moved the main landing gear forward. The plans have since been corrected, and they show the landing gear in a more forward position.

For takeoff, hold full up-elevator until the plane gathers enough speed to be steered with the rudder. Gradually reduce up-elevator, and allow the tail to come up while the plane accelerates on the mains to takeoff speed. Then a little up-elevator, and you're off and flying. The first takeoff was straight with a little right rudder, and the trim adjustments in flight were negligible.

The 2 degrees of washout give a gentle straight-ahead stall, so low-speed landings present no "snap danger." The Spitfire is a clean, low-drag airplane, and with a wing loading of only 21 ounces per square foot, it has a long, flat glide. Set up the approach far enough out to allow the speed to bleed off, and land the Spitfire on the mains. Rollout will be straight with no danger of ground looping. It looks very scale-like as it makes its landing rollout with the tail held high.

• Low-speed performance

The Spitfire has a wide speed range. As mentioned, the low wing loading and built-in washout allow safe, slow flight with no tip stalls. The plane has good control at low speeds with the recommended control throws.

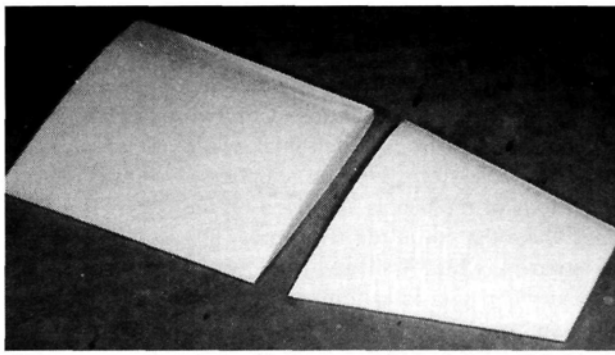
• High-speed performance

The Spitfire flies from low to high speed with no requirement for trim changes. In fact, the wing incidence of 1½ degrees allows the elevator to be at 0 degree for the trim position. I used an HB .61 2-stroke engine, but any good .60-size 2-stroke or a .65- to .70-size 4-stroke will provide good scale performance. The plane tracks very well at high speed and has no bad characteristics such as unplanned snaps during quick pull-ups or tight loops.

• Aerobatics

Though it's not capable of pattern-type aerobatics, the Spitfire has no problem performing a full range of other aerobatics—certainly more than the full-scale airplane. It smoothly executes maneuvers such as the Split-S, rolls, inverted flight, loops and Cuban-8s. The graceful lines of the Spitfire are always an eye-catcher no matter what maneuvers are being flown.

Once you're satisfied with your pushrod installation, glue in the remainder of the stringers with white glue, and add a plywood plate for mounting the tail wheel. Now remove the half-fuselage from the board, add the top formers, stringers, cross braces and the support for the bolt-on tail. Attach the firewall with epoxy, and reinforce it with three, ⅛-inch-diameter hardwood dowels that go through the firewall and into the triangular stock as shown on the plan.



Wing construction starts with two tapered panels for each half win

Sheet the rear of the fuselage under the tail and along the bottom of the fuselage to the wing trailing edge. This sheeting adds a sort of spine to the bottom of the fuselage and greatly strengthens it for those landing mishaps.

Check the fit of the wing to see if the fuselage wing saddle needs any sanding. Using epoxy, attach the hardwood blocks for the wing bolts, allowing for the 1/32-inch-thick plywood wing-saddle cover that goes on top of these blocks. Hold the wing-saddle cover in position while the epoxy sets by clamping the wing to the fuselage with tape, rubber bands, clamps or whatever. Next, fit the wing, and drill for the forward ¼-inch hardwood peg and the 8-32 nylon hold-down bolts.

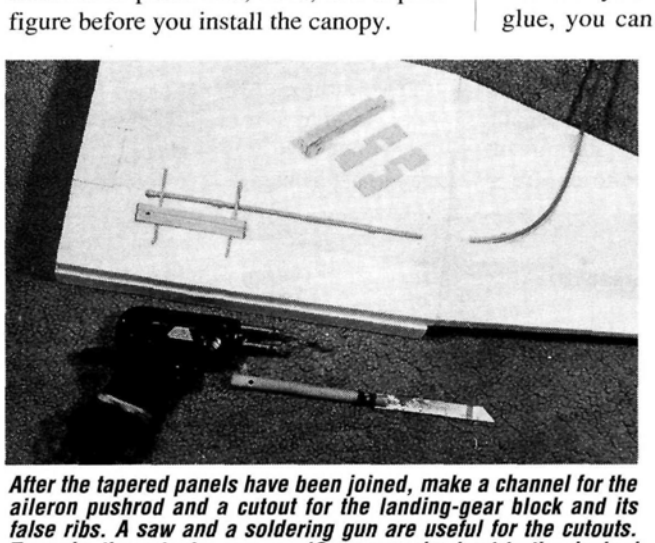
Sheet the forward fuselage and cockpit area with 3/32-inch-thick light balsa. Build the hatch in place, trial-fit the canopy, cut out the cockpit, and line the cockpit insides with 1/64-inch-thick plywood for added strength. Put in an instrument panel and, later, add a pilot figure before you install the canopy.

WING FUSELAGE FILLETS

Now it's time to build the wing-fuselag fillets. This long curved fillet is a trad mark of the Spitfire; don't omit it. Bo the wing onto the fuselage with wa paper between the fuselage and the win Tack-glue the filet supports, and make trial fit with heavy paper or card stoc Carve and sand the fillet supports a required to give a smooth curve. Onc you're satisfied with the fit, dampen th 1/64-inch-thick plywood, and glue every thing into place. Use your favorite fill to form the forward part of the fillet. Th aft portion of the fillet (behind the trai ing edge) is done in a similar way. She the bottom of the fuselage aft of the trai ing edge with 1/16-inch-thick light bals that fairs into the curved fillet.

TAIL ASSEMBLY

For years, I've been using bolt-on ta assemblies for all of my airplanes. Usin the simple "peg-and-two-bolt" attach ment commonly used on wings, bolt-o tails are light and strong. I also find it handy to be able to remove the ta assembly when I carry my airplanes in car-top carrier for "vacation flying Whether you attach the tail with bolts glue, you can easily build a strong ar light tail by the metho outlined here. Becaus the Spitfire has such long fuselage, it's esp cially important to us light balsa for the ta construction. Make template of the horizont stab and elevator toget er, and cut it out of 1/ inch-thick, light bals This forms the core of th tail surface to which yo add the ⅛-inch-squa false ribs, leading ed and doublers as shown the plan. Do this for bo sides, and sand to



After the tapered panels have been joined, make a channel for the aileron pushrod and a cutout for the landing-gear block and its false ribs. A saw and a soldering gun are useful for the cutouts. To make the cutouts, use no. 12 copper wire bent to the desired shape in your soldering gun.

)proximate airfoil shape.

Trial-fit the horizontal tail on e fuselage, and check that it's ırallel to the wing. Now build e vertical tail the same way, ıd glue it perpendicular to the)rizontal tail. Check the entire sembly on the airplane, and inforce the vertical tail with e tail-cone fairing, which can carved of light balsa or built- balsa. Cut the rudder and evator free when you're ready r final sanding and covering.

BUILDING THE COWL

ıe cowl is designed for either .60-size 2-stroke or a .70 stroke engine, and either)uld be mounted horizontally th the exhaust out the bottom. cause the 2-stroke is shorter, spacer block must be installed the firewall.

The cowl can be built of veral materials: fiberglass, pier-mâché, high-impact lystyrene or balsa. I made wls of papier-mâché and etched-formed polystyrene. ee *Model Airplane News*, ıgust 1993, for an article on etch-forming plastics, and *)del Aviation,* July 1992, for chniques on making papier- ıché cowls.) For any of these ethods, except built-up balsa, u must first make a mold rm) of wood or foam in the ape of the cowl. If you're ing to stretch-form plastic er the form, cover it with at ıst two layers of 3-ounce erglass cloth; otherwise, the t polystyrene will deform the)ld. I settled on a 0.060-inch- ck polystyrene that I stretch- rmed in two halves for the wl. Join the halves with fiber- ıss, and reinforce the inside th additional fiberglass cloth. tach the cowl with 4-40 bolts eaded into hardwood blocks ıt are attached to the firewall.

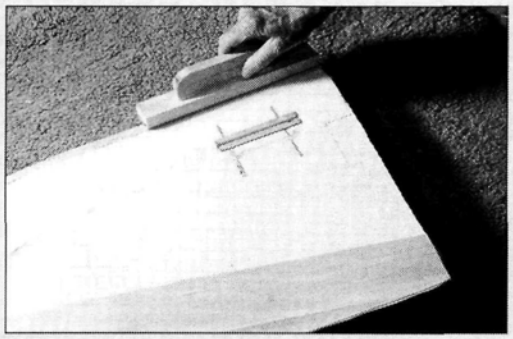
ENGINE AND RADIO INSTALLATION

sition the servos as far forward in the elage as you can. The hatch allows good ess for a 10-ounce tank and the receiver tery.

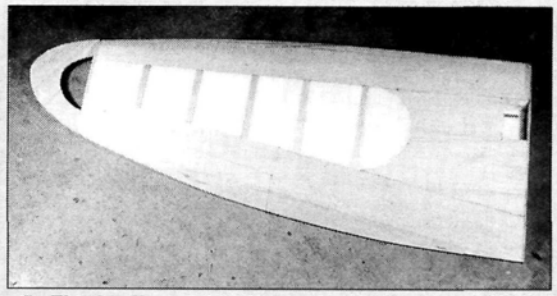
I used an HB .61 2-stroke engine with a ts-style Soundmaster* muffler. The cowl was a tight fit with the Soundmaster, so I added a small blister to the cowl to provide clearance for the muffler. The plans have been modified, so now there is room for the Soundmaster muffler. Other Pitts-style mufflers could be used, but the Soundmaster is one of the best for really reducing the noise. With a 60-size engine, the plane balanced at the CG shown on the plan without adding any weight—always a satisfying result.

COVERING AND FINISHING

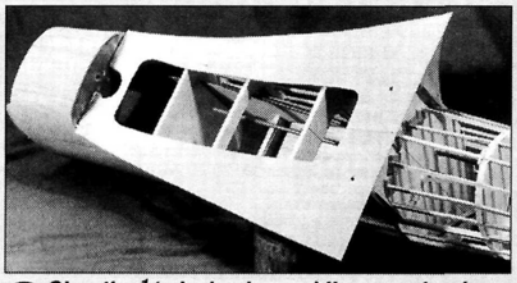
I used the following references for the



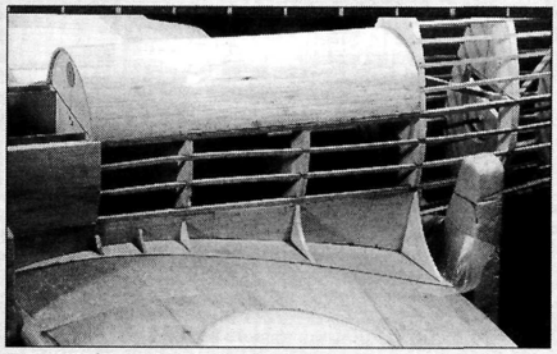
1 *Sand the leading-edge laminations to match the foam airfoil and form the elliptical wing planform. Place a strip of masking tape on the foam next to the leading edge so that you don't gouge the foam as you sand.*



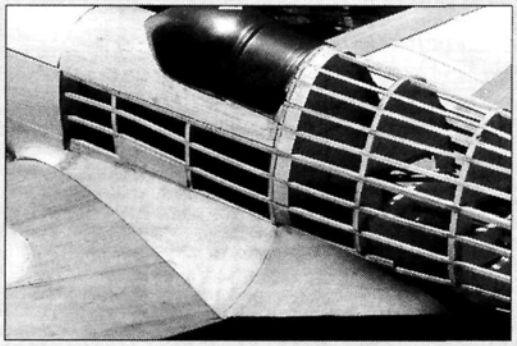
2 *The leading and trailing edges have been sheeted and shaped to form the elliptical planform.*



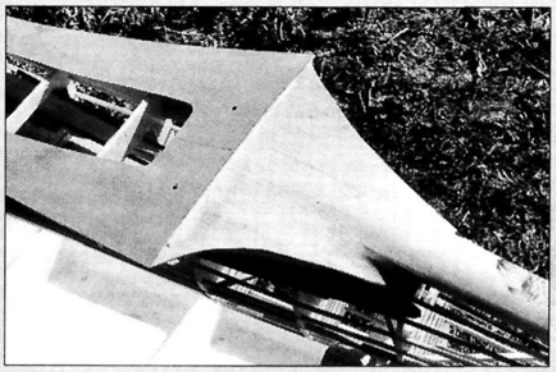
3 *Glue the 1/32-inch wing-saddle cover in place. Make sure that the wing fits snugly against it. It also forms the base for the wing/fuselage fillet.*



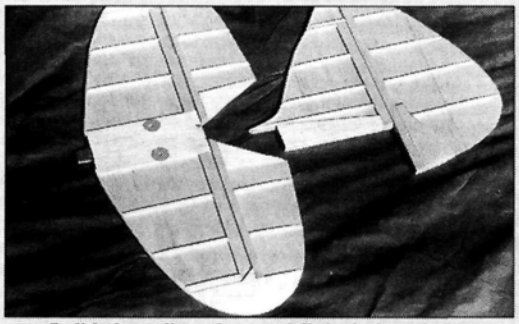
4 *With the wing bolted to the fuselage, glue the fillet supports in place. Before you glue the 1/64-inch-ply fillet, use heavy paper to trial-fit the fillet.*



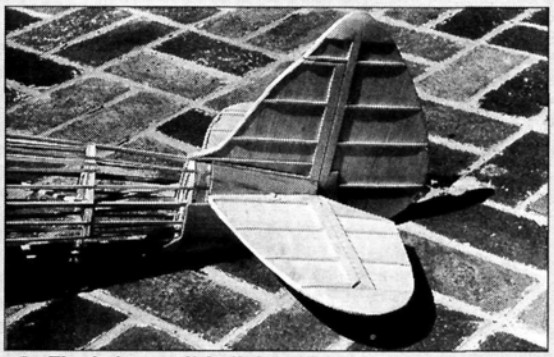
5 *The completed fillet is quite strong. Using Model Magic or your favorite filler, make the forward part of the fillet, which extends to the wing's leading edge.*



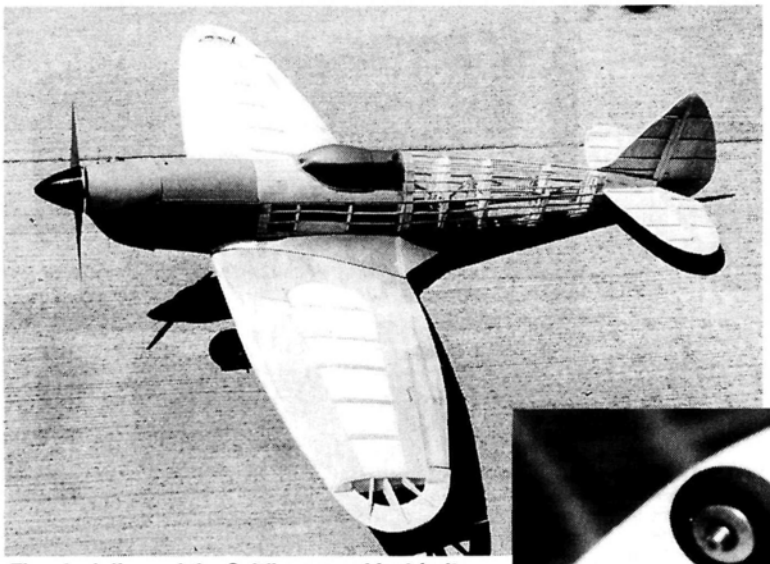
6 *Sheet the bottom of the fuselage so that it fairs into the fillets.*



7 *Build the tail surfaces of light balsa sheet core with false ribs and doublers on both sides. Cut the elevator and rudder free for final sanding and covering.*

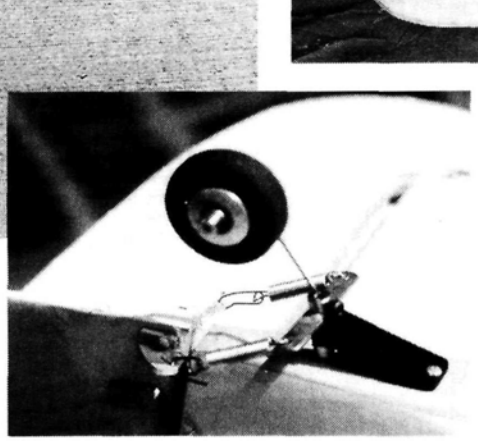


8 *The bolt-on tail is light and strong, and it's easy to transport in a car-top carrier.*



The sleek lines of the Spitfire are evident in its bare-bones state.

Make a mold of foam wood if you want to ma the cowl of papier-mâc or stretch-formed po styrene plastic. (See t for details.)



You can make a good tail wheel with some sheet brass, wheel collars and a couple of springs from the hardware store.

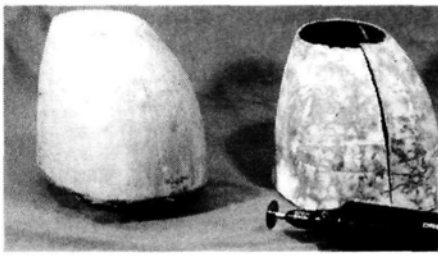
SUMMARY

The Spitfire Mk VIII not often modeled. has the great flyi characteristics of Spitfires while looki a bit different fro the crowd. As a sp scale, it's relatively simple to build, and still has the unique look of a Spitfire. Bu and fly one, and you will get a lot of pl sure from the Spitfire Mk VIII.

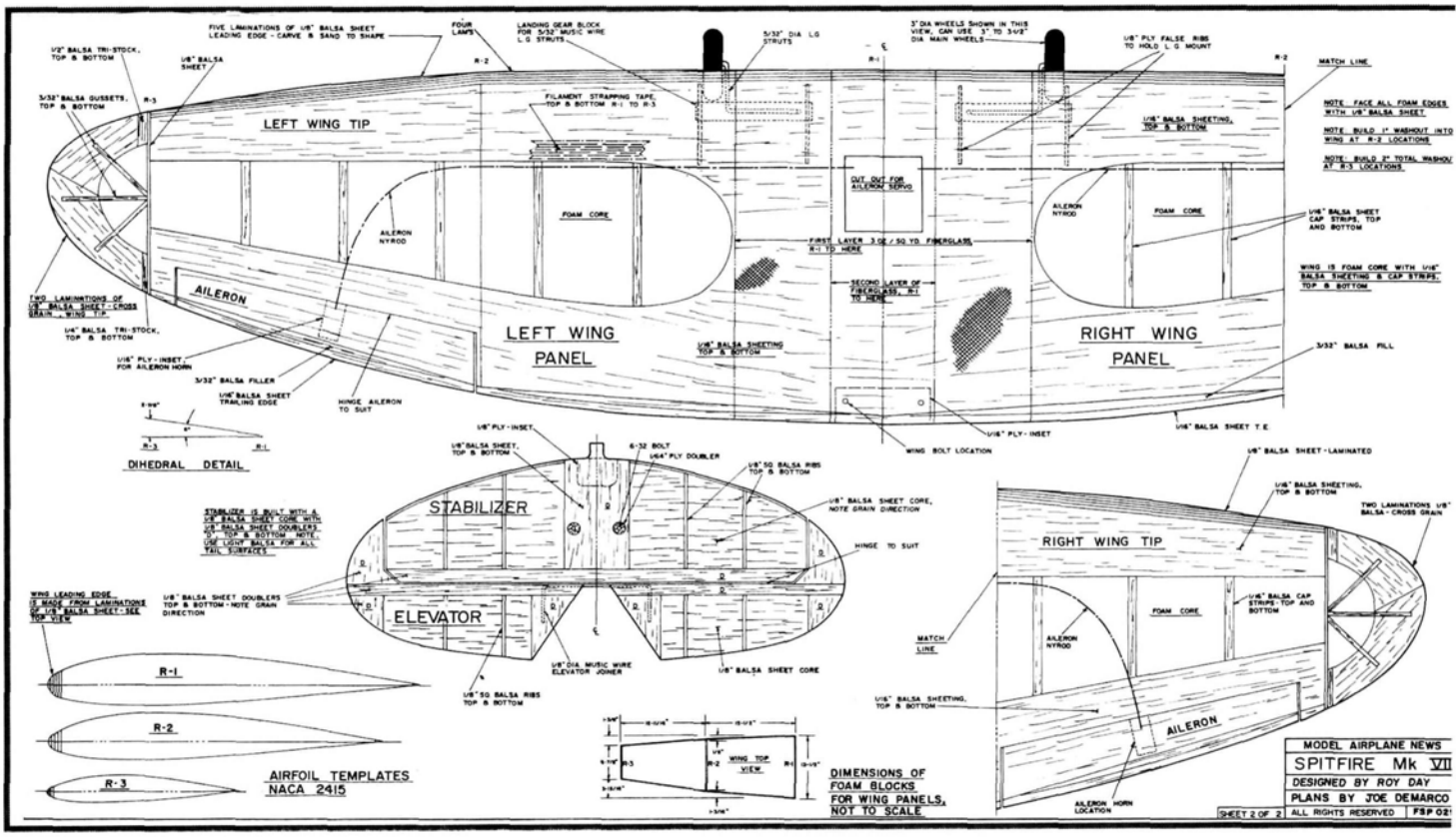
For any questions or comments, conta Roy Day, 11709 Magruder Ln., Rockvil MD 20852; (301) 468-0915.

**Addresses are listed alphabetically in the Inde Manufacturers on page 127.*

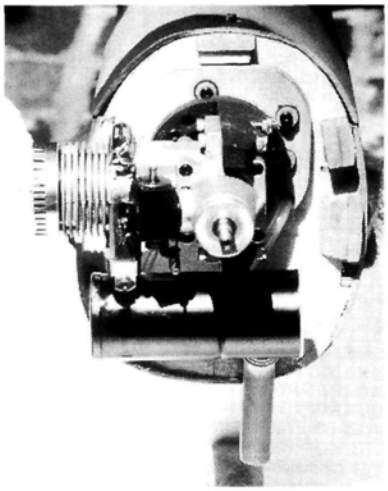
Spitfire's color scheme: "Spitfire in Action" (Squadron/Signal Publication no. 39), and "Spitfire: The Legend Lives On," by Jeremy Flack (Osprey Publications Limited, London, 1992). The sheeted forward part of the fuselage, which corresponds to the long cowl on the Spitfire, was covered with 0.7-ounce fiberglass and painted with Perfect* camouflage paint. The rest of the airplane was covered with Goldberg* Ultracote. Buff the Ultracote lightly with no. 000 steel wool before spray painting it with the camouflage paint. I used corrugated cardboard as paint masks, which gave a soft edge. The addition of the D-Day Invasion Stripes considerably improves its visibility in the air. The stripes, fin flash on the vertical tail and the squadron letters are made of trim material. Actually, I used scrap material that came from a shop that cuts vinyl letters for signs. Roundels are available from Major Decals*.



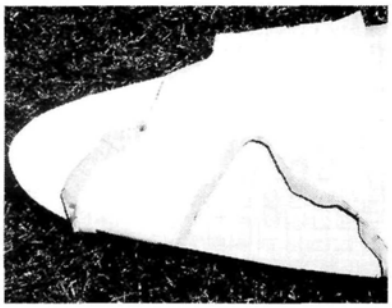
Even with waxing, sometimes the papie mâché cowl has to be split to remove it fr the mold. The author stretched-formed a po styrene plastic cowl.



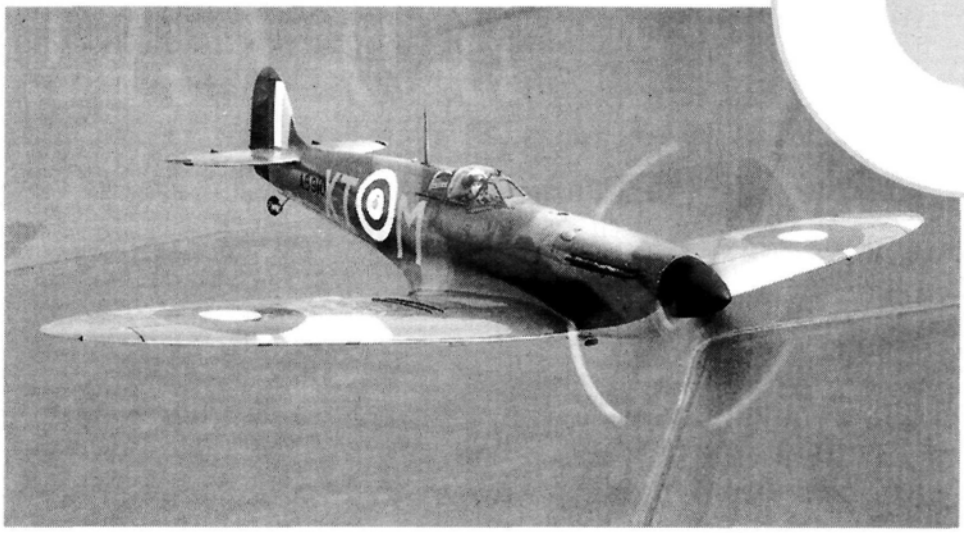
PLAN FSP02951...$15...ORDER FORM ON PAGE 126.



A Soundmaster Pitts-style muffler mounted on the engine was a tight fit for the cowl, but it provided excellent noise reduction. The plans have been modified to provide adequate clearance.

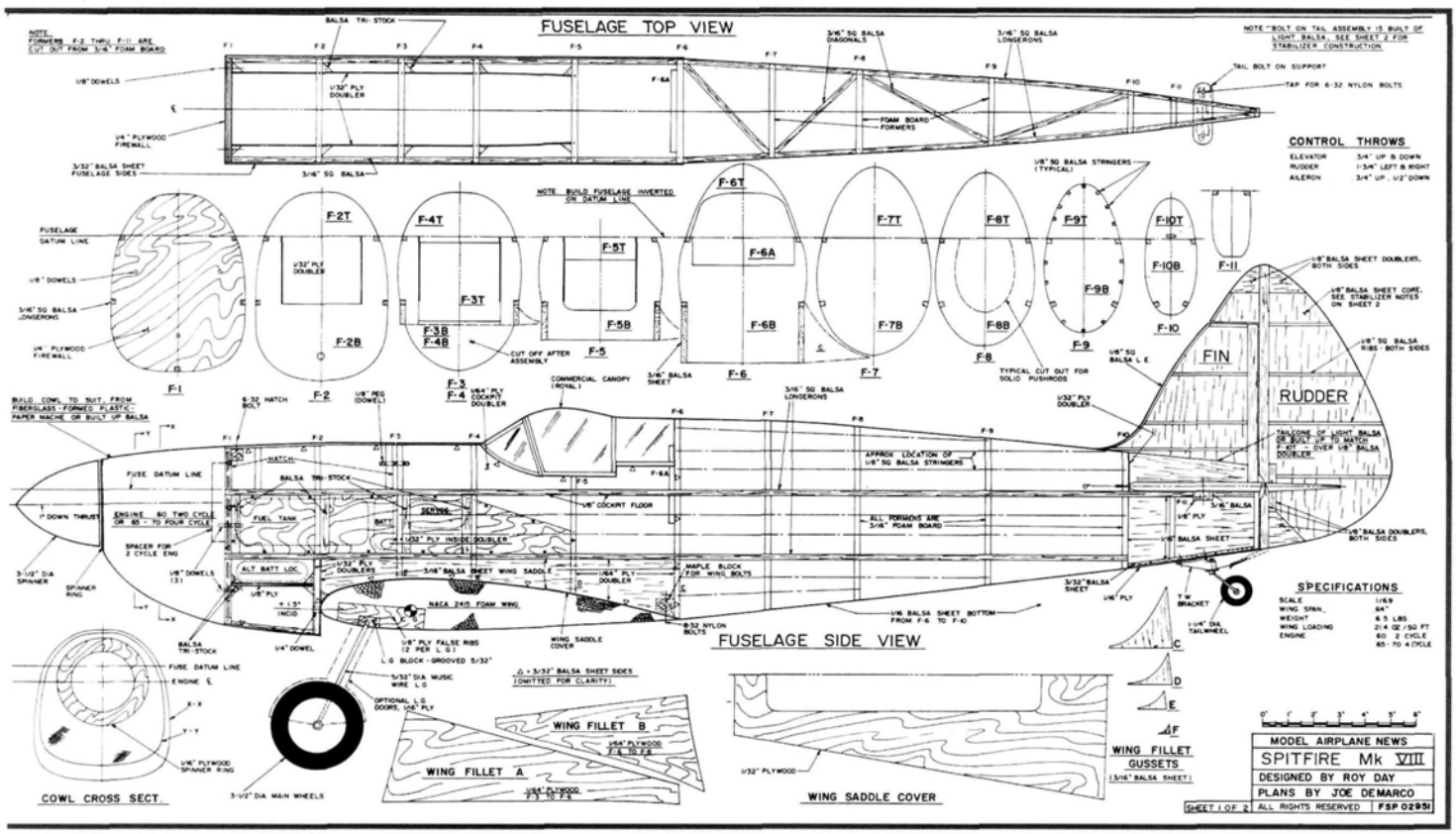


Buff the covering lightly before spraying on the camouflage paint. Use pieces of corrugated cardboard to make the masks for the camouflage paint. It gives a nice soft edge.



Mk VIII—
A faster Spitfire

The first flight of the Spitfire was made in 1936. When production ended in 1949, nearly 23,000 Spitfires and Seafires (the naval version) had been built. The Spitfire was the only Allied fighter produced throughout WW II. When the RAF Spitfire first met the German FW 190 in combat, it was evident that the Spitfire needed an improvement in performance to match the FW 190. Hence, the requirement for the Mk VIII. The Mk VIII incorporated a two-stage supercharger with a more powerful Merlin engine, which resulted in a slightly longer nose and a bigger spinner. To handle the increase in engine power, the Mk VIII required a larger rudder. In fact, the most easily recognizable difference between the Mk VIII and early Spitfires was the enlarged rudder, which was taller and pointed. Earlier Spitfires had rounded rudders. While the Mk 1 Spitfire had about 1,000hp, the Mk VIII had nearly 1,700hp. The Mk VIII became a good combat match for the German FW 190 and the Me 109.



FIELD & BENCH REVIEW

Cox Entry-Level Aircraft

by BILL GRIGGS

R/C becomes a school project

WHILE I WAS DISCUSSING my next "Field & Bench" review with group editor-in-chief Tom Atwood, he mentioned that he had a couple of beginner kits from Cox*. Since my skill level is beyond trainer aircraft, I nearly declined. Then I remembered that my friend Tim Smarzo—an art teacher at a local school—had mentioned that he was starting a school-sponsored airplane club. I contacted Tim and told him about the Cox planes, and he thought that the students, ages 12 to 14, would really benefit from some R/C experience.

The M&Ms (Marcellus Modelers) with their aircraft: standing (left to right)—William McKissick (age 14, with Hurricane sailplane), Tim Smarzo (the instructo and Brian Miller (age 13, with Lectra electric trainer); kneeling—Aaron Hall, (left) age 12, with R/C Commander and Douglas Higgins, age 14, with EZ Bee II.

rian (left) and Aaron show off their new air-lanes. Brian has the Lectra and Aaron has the /C Commander, both of which use Cox ailsafe 2-channel radios for control.

uthor Bill Griggs gives Aaron some tips on ▶ arting the Cox .049 engine.

PHOTOS BY BILL GRIGGS & TIM SMARZO

STUDENT WINGS

ox was gracious enough to send us an air-aft and a radio for each of the four stu-ents involved. Three of the planes—the ommander, the EZ Bee II and the ectra—were identical except for their dios and powerplants; the fourth—the urricane—was a sailplane with a high-art. *[Editor's note: Cox has discontinued e Hurricane, replacing it with the iermal Hawk Glider and Ridge Hawk owered Sailplane.]* With these planes, we ere able to start the kids off right.

All the boys were happy with their planes. They treated minor triumphs, such as getting the engine to fire, as major miracles. I had forgotten the wonder of a first flight.

Part of the deal with them was that each one would write a few paragraphs about his experience. I would then choose the best report and let you readers see what they thought. The report has been edited only for clarity, and the opinions are solely those of the student.

Hooked on Modeling

by Aaron Hall

During the school year, my study hall teacher, Mr. Smarzo, said that he was a modeler. He said that he could teach us to make simple airplanes during our free time in study hall (mostly to keep us out of trou-ble). I became very interested. Mr. Smarzo soon started a model airplane club after school, and that's how I became hooked on modeling.

During one after-school period, Mr. Smarzo announced that he knew someone who could get us R/C planes to learn to fly with. In a couple of weeks, the planes and Mr. Smarzo's friend Mr. Griggs showed up.

When the planes first arrived, they were in big boxes. We were amazed. We had expected little flinky things but, instead, we got planes with 55-inch wingspans. We drew straws to see who would get which plane. I got the gas-powered R/C Commander.

The first thing we did was take out the directions and start putting the planes together. At first, it was very confusing, but it worked out OK.

The hardest part was putting the two nuts on the bottom of the rudder; they were hard to put on. When I got my plane fully together, I was amazed at how big it was. I put the batteries in, and it actually worked! Cool!

The first time we met to fly was fun. I gassed up my engine and tried to start it; it took a while but I finally did get it started. I ran two tanks of gas through it to break in the engine. I didn't fly it that day, but Mr. Smarzo did. While we waited for the next opportunity to fly, I practiced handling my plane by tossing it off my back hill. It was a little hard to control at first, but after a while, I got pretty good at it.

The first time I actually flew the plane, it flew great. I just had to remember to let the plane fly and not try to constantly correct its direction. I flew it two other times that day, and they were both pretty cool.

The last time I flew my plane on that day, the wind came up just as it gained altitude. I watched as it got caught in the wind and flew by itself. I tried to bring it back, but the Failsafe radio wasn't enough, and the plane crashed. When I found it, the wing was broken just beyond the wooden pegs. I don't have to tell you, I've gotten really good at epoxying things back together.

FUSELAGE CONSTRUCTION

The fuselage comes mostly assembled from the factory. The radio gear is already installed, and the engine is already mounted, so there is little left to do. The fuselage cowl consists of two shells that sandwich the plastic firewall. The cowl also covers and protects the receiver and battery box, and provides a place to mount the landing gear.

Tim (left) helps William set the dihedral angle of the Cox Hurricane's wing.

Trainer Squadron

- **The R/C EZ Bee II uses a Cox Cobra 2-channel proportional radio and a Cox Babe Bee .049 engine.**
- **The R/C Commander uses the same engine, but with a Cox 2-channel Failsafe radio.**
- **The Lectra uses the Failsafe radio and a 20W Mabuchi motor.**
- **The Hurricane uses the Failsafe 1-channel radio.**

SPECIFICATIONS

Tim launches the R/C Commander on another flight.

R/C COMMANDER AND R/C EZ BEE II

Model names: R/C Commander and R/C EZ Bee II
Type: Trainer
Manufacturer: Cox Products Inc.
List price: $209 (w/radio—both kits)
Wingspan: 55 in.
Wing area: 340 sq. in.
Weight: 24 oz.
Wing loading: 10.2 oz.-sq. ft.
Length: 31 in.
Engine req'd/used: Cox Babe Bee .049
Prop used: 6x3
No. of channels req'd: 2
Radios used: R/C Commander—Cox Failsafe; R/C EZ Bee II—Cox Cobra proportional
Wing construction: injection-molded foam
Kit construction: injection-molded foam and plastic motor mount
Chord: 7⅛ in. (root), 5¼ in. (tip)
Features: assembly time—1 to 2 hours; all hardware supplied; unique hardware—clevis and control horns; multicolored, self-adhesive decals; no plans; exploded views included; 6-page construction manual with isometric drawings; 6-page flight instruction pamphlet

Radios:
R/C Commander: Failsafe 2-channel. The Cox Failsafe system is a proportional radio with one difference; when a channel is activated, the servo will automatically recenter itself after about 1 second. This feature is designed to eliminate the chance of over-controlling. The system features a video-game style controller that takes advantage of youngsters' video-game experience. The receiver and servos are integrated into one, hard-wired package.
List Price: $79.95
Servos: integrated with receiver
Receiver: 27MHz lightweight system
Battery capacity: four AAA alkaline cells

R/C EZ Bee II: Cox Cobra 2-channel. Aim designed transmitter case with single stick, 2-channel, AM, narrow-band receiver and two mini-servos. Optional Ni-Cd batteries are available, but aren't supplied.
List price: $109.95
Servos: 80111 mini-servos; weight 1.12 oz.
Receiver: 8214 72MHz, 12 channels; weight 1.11 oz.
Battery capacity: four AAA alkaline cells

The Lectra electric trainer on its first flight.

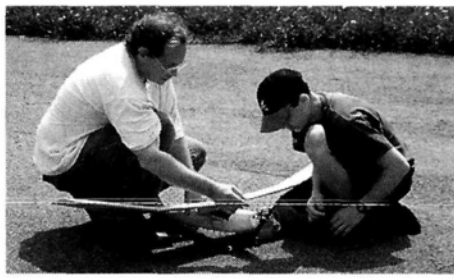
LECTRA

Model name: Lectra
Type: electric trainer
Manufacturer: Cox Products Inc.
List price: $209 (w/radio)
Wingspan: 55 in.
Wing area: 340 sq. in.
Weight: 26 oz.
Wing loading: 11 oz.-sq. ft.
Length: 31 in.
Engine req'd/used: Cox geared electric motor
Prop used: 6x3
No. of channels req'd: 2
Radio used: Cox Failsafe
Kit construction: injection-molded foam and plastic motor mount
Chord: 7⅛ in. (root), 5¼ in. (tip)
Features: assembly time—1 to 2 hours; no plans; exploded views included; 6-page construction manual with isometric drawings; 6-page flight instruction pamphlet

Hits
- Flew well; the engine had lots of power.
- Instructions laid out with a picture and name of every part.
- Easy to glue together.

Misses
- Radio system did not give enough control response.
- Plans need to stress the importance of balancing.

Recommended modifications: I strongly recommend that you buy a Cox Cobra proportional radio for this plane because then it will really come into its own; the enjoyment will more than make up for the increased cost.



Tim (left) and Aaron start the engine on the R/C Commander.

One half of the cowl has to be removed s
that the four AAA alkaline batteries can b
installed. The cowl is then put back int
place and held by four screws.

Next, the landing gear is snapped int
place and the decals are applied. The dec
that simulates a windshield covers bot
halves of the cowl. This makes it impossib
to replace the batteries without first cuttin
the decal.

STABILIZER/ELEVATOR

The rudder and the elevator come alread
hinged together and attached, with tape, t
the stabilizers. This tape was later loosene
by the fuel, so I recommend that you insta
Sig* easy hinges instead.

The rudder and elevator control horns ar
unique because they are snapped, rather tha
screwed, together. The two pieces must b
squeezed together tightly with needle-nos
pliers, but you must be careful not to crus
the foam wings. The vertical stabilizer ha
two plastic rods embedded in it. These roc
have threads cut in them for the tail moun
ing screws that hold everything in place
The rods slide through holes in the horizon
tal stabilizer and the fuselage and ar
secured with nuts. All the kids agreed th
this was the most difficult part of the assen
bly because the rods tended to spring bac
into place instead of tightening up.

RADIO INSTALLATION

The Cox Failsafe radio receiver and serv
come already installed in the fuselage wi
hot glue, but the pushrods have to be installe
The kit includes unique T-shape clevises th
you thread onto the wire pushrods. The en
of the clevises are then folded up and snappe
into place on the control horns. (The T shap
of the clevises makes them easier to threa
onto the pushrods.) After the pushrods ha
been attached, we performed a radio test
check that they didn't bind when they we
operated.

WING CONSTRUCTION

The foam wing consists of two molde
halves that are connected by two 3/16-inc

FLIGHT PERFORMANCE

Note: this describes the performance of the R/C Commander only. Similar performance can be expected from the EZ Bee II and Lectra.

- **Test flight.** Choose the largest open area you can find for your test flights. Also, wait until the early morning or late evening, when the winds are the lightest.
- **Trimming.** Spend plenty of time trimming the CG and the lateral balance of the plane before going to the field. Do several hand-launches, and adjust the trim levers until the glide is consistent.
- **Launching/takeoffs/climb-outs.** The R/C Commander climbs out nicely from a hand-launch. Allow the plane to accelerate for a second before giving any control inputs; the increased air speed will make the controls more responsive.
- **Stalls.** The R/C Commander stalls abruptly and "consumes" altitude, but it tip stalls only when the wing is not laterally balanced.
- **Speed range.** Slow.
- **Low speed/control sensitivity.** Marginal.
- **Aerobatics.** We were unable to perform aerobatics because this plane was not designed for that.
- **High wind handling.** Don't attempt to fly this plane in winds of more than 5mph; it is designed for calm conditions and does not respond well to wind gusts.
- **Landings.** This plane requires little or no input to land. Properly trimmed, the R/C Commander is capable of landing itself.

liameter dowels that also erve as dihedral braces. The wo wing pieces are taped ogether with the special eavy-duty tape that's supplied. It's critical hat the tape be aligned correctly the first ime, because the wing derives its strength rom the tape's adhesion. The dowels could lso be epoxied into place for extra trength.

The kit contains four adhesive Mylar ing protectors that prevent the rubber and from damaging the wings. The protectors are very stiff and don't conform well to the wing's shape. Later, they fell off, after fuel had soaked them and loosened their adhesive; I recommend that you replace the protectors with a few layers of strapping tape.

The wing of the R/C Commander *must be balanced laterally!* If it isn't perfectly balanced, the finished plane will not fly straight. We used wood screws to add weight to the lighter wing half. This completed the basic construction.

CONCLUSION

When properly constructed, this plane behaves like a free-flight plane with radio-assist. If you're an experienced pilot you'll find that radio response, using the Failsafe system, is sluggish and difficult to master. You have to remember to pulse the controls because the control surfaces automatically re-center themselves. Children seem to master the control surfaces faster than adults, probably because the Failsafe's configuration is similar to that of a video-game controller. Adults should let the kids fly while offering heading correction advice.

As it turned out, the Cox trainers will virtually fly themselves. The secret is to spend a lot of time working out the lateral and longitudinal balance and then work on the trim until the plane flies perfectly straight. If the Cox planes are treated like ½A free-flight planes and are trimmed out for free flight, they should perform well. I'm looking forward to more flying with the club.

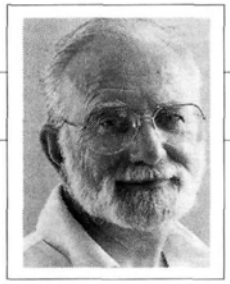
Brian tightens the stab on his Cox Lectra.

FROM THE AUTHOR

It was gratifying to see the look of joy and wonder on the students' faces and to know that I had played a small part in it. I felt good about having been able to help them.

**Addresses are listed alphabetically in the Index of Manufacturers on page 127.* ■

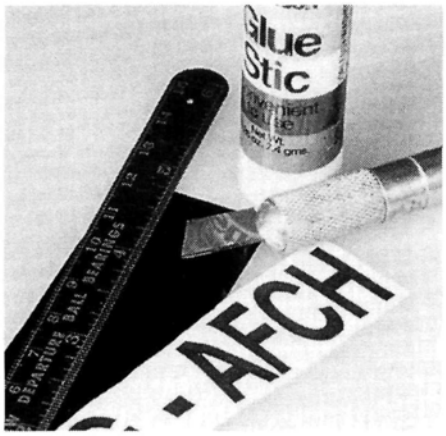
HOW TO:



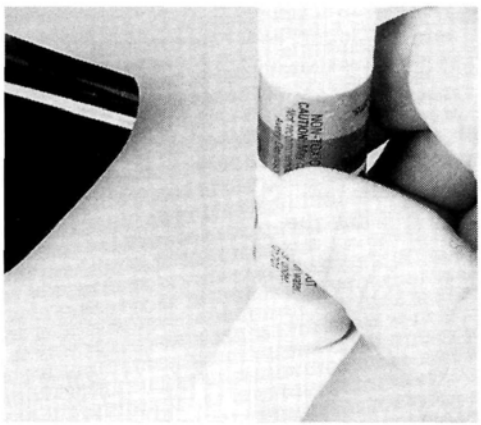
RANDY RANDOLPH

USE COMPUTER-GENERATED DETAILS

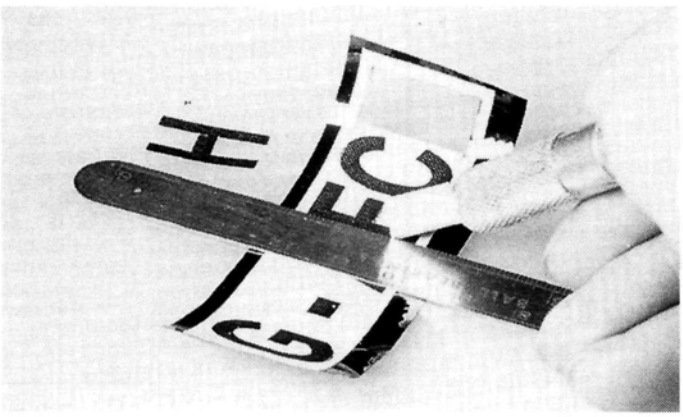
Almost everyone has access to a computer, and just about every computer has the software to generate large letters and numbers in many different styles. These photos show a simple way to use computer-generated characters with iron-on plastic films that will add detail to any project.



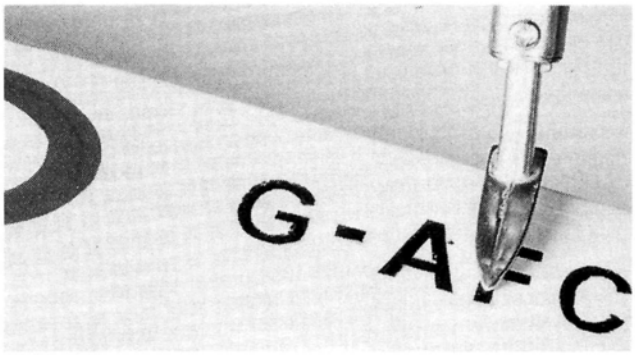
1 *You'll need: a razor knife, plastic film, a steel straightedge, a glue stick and computer-generated characters. These letters were done on a laser printer, but any printer will produce similar results.*



2 *Coat the back of the character sheet with glue; be sure to spread glue over the entire back of the letters, all the way out to the edges. Stick the letters face up on the top side of the plastic film.*

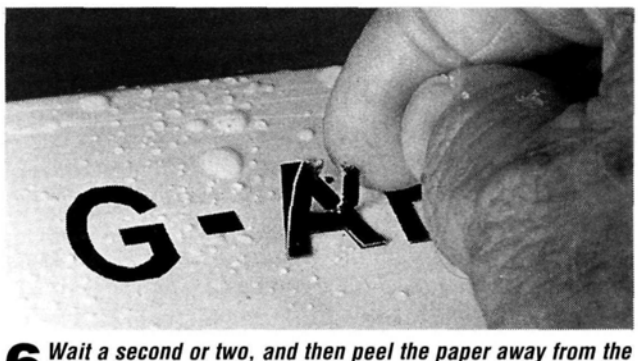


3 *Use a metal straightedge and a razor knife to cut out the characters. To make the job a lot easier, place a cutting board or a piece of card stock under the film. Remove any plastic backing from the film characters.*



4 *Tack the characters, paper and all, where you want them to go on the airplane. (A trim iron is best, but any iron will do.) Laser-printed letters are heat-sensitive, and the iron will smudge them, so keep the iron in the center of the numbers when you tack them into place.*

5 *When the characters have been tacked into place, spray them with water to loosen the glue that holds the paper to the plastic film.*



PHOTOS BY RANDY RANDOLPH

6 *Wait a second or two, and then peel the paper away from the film. Flush the film with more water to remove any remaining glue, then wipe the water off. To remove air bubbles, use a soft cloth to smooth over the film characters before you permanently iron them down.*

FIELD & BENCH REVIEW

GLOBAL

.60-size, Vietnam-era, multi-task warbird Skyraider

by PAT McCURRY

THE DOUGLAS AD SKYRAIDER probably ranks right up there with the DC-3/C-47 when we talk about one airplane's useful life. Starting with Korea in the early '50s, this huge aircraft served in every conflict, right through the last days of Viet Nam. It was used by the U.S. Air Force, the U.S. Navy and almost every "free nation" in the world. The Skyraider spanned 50 feet exactly, it had a maximum speed of 325 knots and carried as much payload as a B-17 bomber of WW II. As well as being a very stable gun and bomb platform, it could also do limited aerobatics. Its planform, which features a big, double-tapered wing, a gigantic stab and an enormous fin and rudder, makes it an ideal subject for modeling.

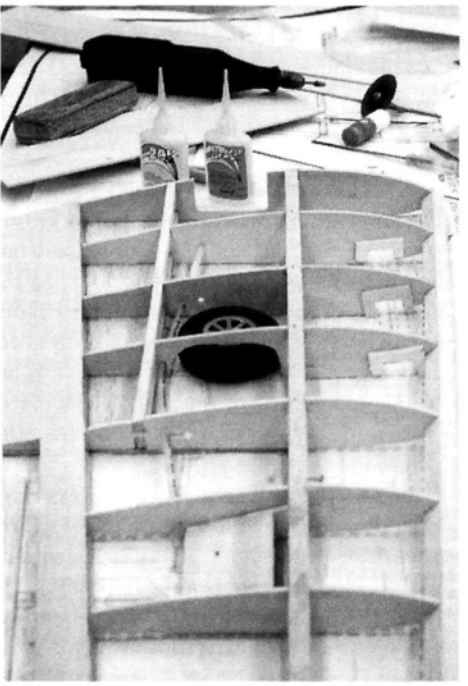
Author Pat McCurry (left) and Model Airplane News columnist Frank Tiano pose with their Global Skyraiders. Pat used an O.S. .90 4-stroke, and Frank chose a Saito .80 4-stroke.

WELCOME ADDITION

Other than the full-blown, exact-scale, 9(inch Skyraiders campaigned by Gene Bart(and Diego Lopez, there really hasn't bee much activity with models of this aircra Dave Platt designed one some years ago, ar it flew just great. Nick Ziroli has plans for rather large one but, for some reason, choo es not to advertise it. And now we can thar Global Kits* for giving us a Skyraider that quick and easy to build and really perform It may be a little small for some, but it mak up for that with the excitement it produces.

WHAT DO YOU GET?

This is a kit *review*, not a rewording of tl instructions. I think it's far more important show prospective buyers what they can expe from the time they place an order to the da when the empty kit box is relegated to a scr balsa bin. You'll need some information, course, just to help you decide whether th model meets your needs (see tl Specifications chart). Its finished weight w depend on whether you install retractable



ere's the general wing construction. If you tend to install retracts, it is important to arch e plastic pushrod for aileron control back to ear the tire.

xed gear, whether you use a .60 2-stroke or a 0 4-stroke and whether you decide to cover with plastic film or something heavier.

The kit is well-packaged; some thought ent into ensuring that the kit reaches its :stination undamaged. As you casually ıload the box, you'll come across a hand-ome, 31-page instruction book, a nice set of ans and some average, sticker-type mark-gs. The wood is all good to very good. ight there on the front page of the instruc-on book you're told which parts you must ıy to complete the Skyraider—an engine; a dio; three rolls of covering; a typical selec-on of hardware, such as pushrods, wheel ollars, control horns and the like; Robart* ale tires of a specific size; a 16-ounce fuel nk; and, of course, some adhesives to hold e entire thing together. I ıose to use Zap* adhe-ves throughout, including eir 5- and 30-minute Z-oxys. The instructions so tell you which tools ou'll need for construc-on. There's nothing ıusual here—hobby ife, saw, drill and bits, ndpaper, pins, clamps, d a razor plane. Oh, yes; straight, flat workbench invaluable when con-ucting this bird!

BUILDING THE BIRD

Global's Skyraider features rather conventional construction methods and materials. The entire kit is made of balsa and light plywood, and the hard-to-form parts are thoughtfully provided in molded plastic.

The kit can be built quite rapidly. Sometimes, more experienced modelers might question the way things are done, but the important thing here is that the job gets done and done well. A few parts will require a slight trimming to fit perfectly, but that's why we have sanding blocks—right? When sheeting has to be bent around a structure, I first spray it with any window cleaner that contains ammonia; this helps the sheet to conform to the contours I need. As a general guide, I use thin Zap and medium Zap-a-Gap, except in areas such as the firewall and landing gear, where I used Z-Poxy because of its greater flexibility. Before covering, without a radio system and engine, the Skyraider weighed about 3½ pounds.

All but *one* of the plastic parts proved to be strong enough to withstand everyday kind of flying. The cowl, though very light, was way too thin, and it should be reinforced in any way you like. I simply laid some Dan Parsons* fiberglass cloth inside the cowl parts and then saturated the cloth with thin Zap. The CA completely filled the cloth's weave and helped to make the cowl more rigid. Where the screws that hold the cowl in place go through it, I reinforced it with scrap plastic "Zapped" into place on the inside. This ensures that the screws will not vibrate and chafe through the cowl while flying.

"Sporty Scale" columnist Frank Tiano and I each built a Raider, and his cowl was the first to come loose in flight and slip down the back edges of the spinning propeller. You know the rest! My reinforced cowl has stayed intact. And speaking of cowls, if you'd like them to form a straight-looking

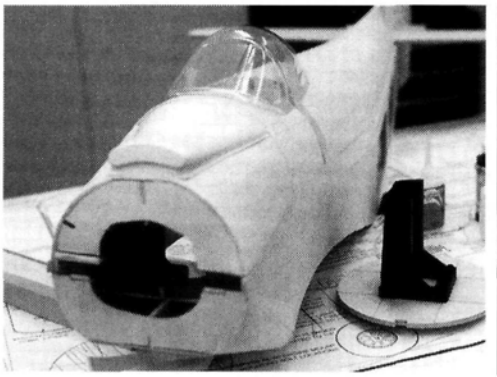
SPECIFICATIONS

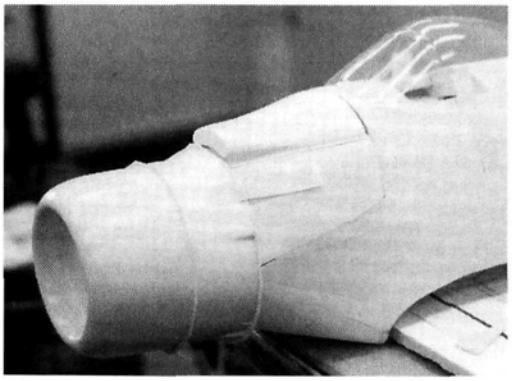
Model: Douglas Skyraider
Manufacturer: Global Kits
Type: Sport-scale fighter
Wingspan: 62.5 in.
Wing area: 664 sq. in.
Airfoil: Semisymmetrical
Weight: 7.5 to 9 lb.
No. of channels req'd: 4 (throttle, aileron, rudder and elevator; optional retracts)
Radio used: JR 6-channel
Engine req'd: from .60 to .65 -2-stroke to a .90 4-stroke
Engine used: O.S. .90 4-stroke
List price: $159.95

Features: die-cut and machine-cut, self-jigging balsa and light plywood part; built-in washout in wings; formed-plastic parts—top and bottom air scoops, engine cowl and clear canopy; formed-wire landing gear; plans; 31-page instruction book; and adhesive markings.

Hits
- Easy, light construction.
- Wood good to very good.
- Good-looking.
- Good flight characteristics.
- Kit may be adapted to Robart retracts very easily.

Misses
- Formed engine cowl is a bit thin and should be reinforced with fiberglass.
- Horizontal stabilizer should be sheeted with hard, 1/16-inch-thick, balsa sheeting.





Above left: here, the fuselage has been completely planked and is ready for the installation of the firewall. The engine mount shown is included in the kit. Above right: here, the two-piece engine cowl is being roughly fitted to the fuselage. It's a good idea to reinforce the cowl with fiberglass cloth on the inside to prevent it from cracking around the mounting-screw holes.

piece, it is absolutely necessary that a great deal of care be taken when assembling the cowl parts!

STRONGER TAIL

Time has proven that there are two areas of the Skyraider's construction that should be reconsidered.

• The stab is built like a stick model. You know; you pin down the leading and trailing edges, slip in the wingtips and center-section sheeting and then glue in some ¼x3/16-inch flat balsa ribs between the leading and trailing edges. The entire structure is then covered with 1/16-inch-thick sheeting. Herein lies the chance of a problem. Because the softness of the wood varies between kits, you *may* find that your stab, although very light, is not quite strong enough for very stressful maneuvers. And in my experience, it certainly isn't strong enough for any prolonged dives during which speed builds up and perhaps causes the rear stab and elevators to flutter. To test this, I built my stab in the stock way, and Frank added an additional ¼x⅜-inch spar, spanwise, for rigidity. He then picked some very hard 1/16-inch-thick balsa for tab sheeting.

Last, but not least, he fashioned a sturdy elevator-control wire and horn out of 3/3 inch-diameter music wire and brass, whi were soldered together. We both made ce tain that the plastic pushrod sleeves for el vator control were supported in at lea three places so that they wouldn't flex.

COVERING AND FINISH

I elected to use Coverite's* 21st Centu covering material and paint because I ha heard so much about the products at th '94 WRAM trade show in White Plain NY. The Coverite film proved to be ve easy to use, especially around the unusua compound curves of the rear fuselage se tion and—everybody's favorite—th wingtips.

Even though most modelers us Coverite's Balsarite to prepare the wood f covering, Frank and I tried one airplan with it, and the other without. Frankly, far as the final appearance is concerned, w can't see a difference; but after 60 or s flights, I now wish that we had used th Balsarite on both planes. Fuel and grim somehow always finds a way to creep in the covering seams, especially while you'

Here's the crack caused by high-speed flutte It was easily fixed by re-sheeting the stab wi hard, 1/16-inch-thick balsa. Adding another sp during construction and using stiff sheeti will prevent this from happening.

cleaning the oily mess off your model wi a paper towel. In retrospect, I think the ext "glue" afforded by the Balsarite might hav been a lot more aggressive in keeping tho seams tight.

A real bonus came when I sprayed th plastic parts with the 21st Century pain They match the covering very, very we in fact, exactly! Nothing bothers me mo than a great covering job spoiled by cow and accessories that sport a contrastin shade of what was *supposed* to be the san color as the main airframe.

FINAL ASSEMBLY

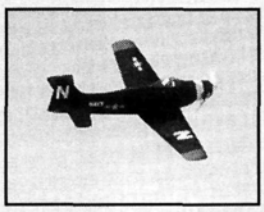
Radio installation is truly a breeze. installed a JR* Remote Control 6-chann radio, and Frank used a new Airtronic PCM 6. Both the JR and the Airtroni have servos of about the same size and ou put, by the way. In both cases, we found n need for anything but servos of standa size. When it was time to install th engines, Frank grabbed his trusty Saito Gold Knight .80 4-stroke, and I picked

FLIGHT PERFORMANCE

The day we picked for test flying proved to be a great one. At 9 a.m., we were ready to go—a beautiful blue sky, the sun at our backs and a gentle breeze blowing right down the runway. Temperature was about 78 degrees. My white ship was first.

• Takeoff and landing

The O.S. .90 came to life and sounded just fine. I taxied out to the runway, gave one last control check and slowly advanced the throttle. The 8-pound Skyraider tracked like a freight train and gently lifted off. I retracted the gear, and after climbing it straight out for a few seconds, made my first left turn and started to check whether any trim changes or adjustments were needed. When it was time to land, I throttled back the O.S. on the downwind leg, and the airplane showed a great glide ratio at idle. I turned on final, and the Skyraider settled into a perfectly flat and predictable sink rate to landing. A little flare just inches off the runway, and the bird was home.



• Slow-speed performance

It takes a lot of effort to get the model to stall. When the model does stall, the break is gentle and one wingtip drops slightly, but recovery is straight ahead. Recovery is accomplished simply by releasing all the controls; the model starts flying by itself again. At no time did the model ever show signs of tip-stalling. When the retracts are pulled up or down, no trim change is required. Again, balancing the model with an empty tank and with the retracts in the up position is the key to ensuring good flight characteristics.

• High-speed performance

Ailerons and rudder were fine, but the faster the airplane went, the more it seemed to want to climb and the more down-trim was needed. Finally, at full speed, it was flying well but with almost full down-trim on the JR transmitter.

• Aerobatics

Rolling the airplane over on its back, I experimented with how much down-stick would be required to fly inverted—quite a bit, actually. I thought that with all that down-trim, inverted flight would be almost hands-off. I guess that a flat-bottom wing reacts to inverted flight a little differently from a semisymmetrical one, regardless of which airframe it's mounted on. In all fairness, however, the bird was quite stable when inverted, as long as I held in some down-stick pressure. While Frank called out various maneuvers, I tried them. Truly, though this isn't a pattern bird, it could do any normal maneuver. No, it won't snap or spin too well, and it sure can't do a knife-edge loop, but its rolling maneuver, stall turns, inverted flybys, four-point rolls and consecutive loops all looked good to us.

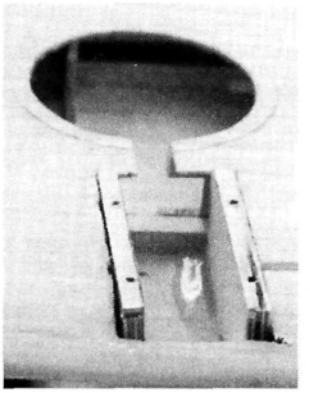
Tiano's thoughts

To say I was excited and couldn't wait to put my own Raider up would be a tremendous understatement. So with Pat holding on to the tail, I fired up the Saito, checked the throttle response and the controls. Everything looked OK to me so down the taxiway I went. By the way, this airplane has no tendency whatsoever to nose over, even on grass—weeds yes; grass no! I turned the blue Douglas into the wind and advanced the throttle, much as Pat had done. And from that point on, as Yogi Berra used to say, "It was déja vu all over again"! My Raider climbed like a homesick angel just like the white one had done; only I didn't have enough down-trim available to me on the Airtronics transmitter, so I had to land and readjust the elevator-servo pushrod. The landing was picture-perfect and, once again, Robart gets a cheer for designing a great gear set. It stayed tucked in its well, even during aerobatic maneuvers, and it came down and locked when commanded to. After the adjustments had been made, I took the Raider back up to altitude to wring it out. Nothing new to report here; it flew exactly like Pat's airplane. I needed some down-trim, too. and everything else was a carbon-copy flight. I particularly enjoyed doing some very low flybys, both upright and inverted. Especially in the upright position, the Raider is very stable, and I imagine that these low passes will become one of the maneuvers it is known for.

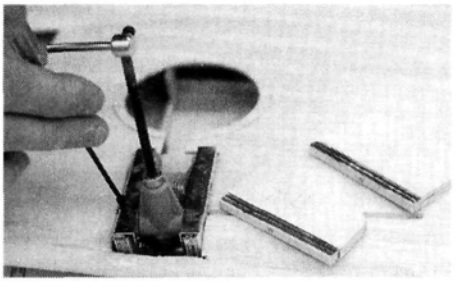
Installing Robart Retracts

Judging by the way Robart's 90-degree rotating retractable landing gear fit into the Global Skyraider's wing, you might think that the airplane was designed with them in mind. Installation could not be any simpler. It's easiest to do this during construction, but it's almost as easy to do after the plane has been flown with the kit's fixed gear already installed. Here's how I did it.

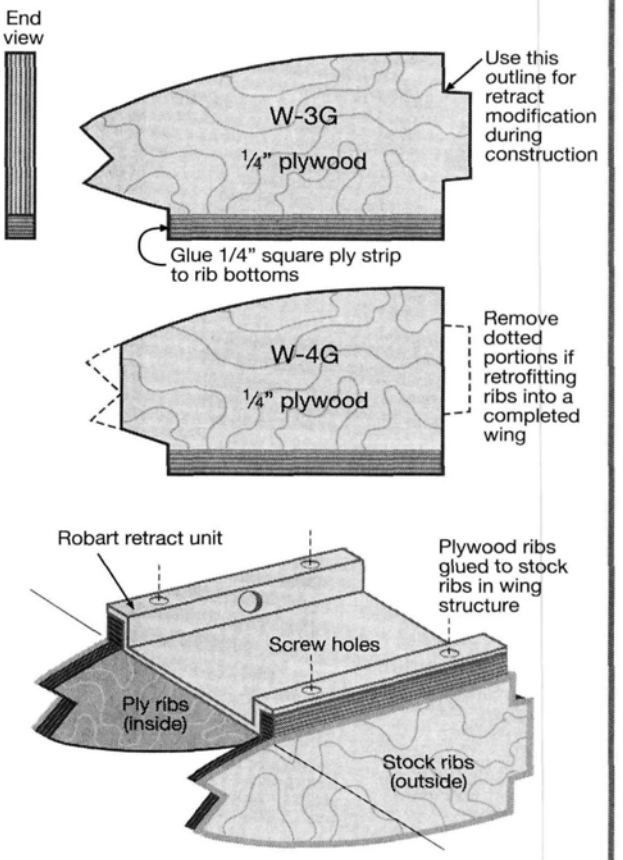
- Make duplicates of ribs 3 and 4 out of ¼-inch plywood, from the main spar to the leading edge (see illustration). The ribs must have a protrusion as shown so that the gear will sit a little away from the wing's surface.
- Cut two more pieces of ¼-inch plywood, and glue them to the ribs so that the landing-gear mounting screws are not going into the end grain of the plywood ribs.
- Epoxy the new plywood ribs into place firmly against the stock balsa ribs, making sure that the rear of the ribs fit snugly between the top and bottom spars.
- When the epoxy has cured, with no. 4 screws, mount the gear in pre-drilled holes, which you harden by flooding with Zap CA.



Here, the ¼-inch plywood landing-gear ribs have been installed. They are glued tightly against the stock ribs and protrude above the bottom surface of the wing.



The Robart 90-degree rotating retracts are simply screwed into place. This modification can be made while building the wing or after it has been built.



ı O.S.* .90. Since Frank had a pair of ·and-new 12.5x8 three-blade props in his orkshop, we both installed them. urprisingly, later tests showed the .90 out-·vved the .80 by a mere 300rpm. In any ·ent, both engines are a little large for the ɔmpartment but, hey, this ain't exactly a ɔmpetition model, so what the heck?

Stock mufflers are used on both ŋgines. Frank's Saito/Airtronics-ɥuipped, dark-blue Skyraider needed just ounces to balance according to the plans, hile my white, O.S./JR-guided bird quired 3 ounces. We checked the balance ɔints with the optional Robart* 90-degree tract gear in the retracted position and ithout fuel in the tank. This later proved be ideal.

IN-FLIGHT SITUATIONS

uring many, many flights, we encoun-red a couple of problems that we were ɔle to deal with quickly and efficiently. n one flight, Frank noticed that he had to ɔld more and more down-stick to keep e airplane level. He landed immediately ıd found that one of the 2-ounce lead eights in the nose had come loose and lled back along the fuselage, causing an arming, but controllable change in the ılance point. In other words, the ʏyraider became a bit tail-heavy. We ust applaud the designer because the air-plane never became dangerously out of control and was brought back to the runway rather easily.

The other problem occurred while I was coming out of a split-S maneuver from about 500 feet. On the way down, we heard a faint rumble, and Frank yelled, "Throttle back," which I did almost before the second word was out of his mouth. I brought the bird down, and we checked out all control surfaces. As we suspected, several rounds of almost violent aerobatics had produced a crack that ran chordwise from the trailing edge of the stab forward. We took the airplane back to the workshop, pulled back the Coverite, removed the soft balsa sheeting and replaced it with a much harder piece. Then we re-covered it and went out to fly again. The flutter problem had gone. We were happy!

ON FINAL

I really like this airplane; it's a pretty good value, too. The few parts that didn't fit exactly didn't mean beans to me because I still think modelers should be able to handle things like that. Airplane kits that are put out when the designer fully knows that the model doesn't fly well are what upset me. There is nothing to be upset about with this kit. It builds neatly, too; there isn't too much debris all over the shop floor when you've finished.

And if you choose the 21st Century covering, I'm sure you'll agree that you can finish in record time. In the unlikely event that you whack this airplane, Global offers replacement plastic parts through your dealer or Hobby Shack. I've seen several other Skyraiders fly, and they all seem to be the same. I know that the F-Troop has a squadron of them completed.

A regular 2-stroke .60 provides plenty of power, and the airplane flies much faster. Robart retracts are ridiculously easy to retrofit, so go ahead and build it with the enclosed fixed gear if you like, then step up to the retracts at a later date. If you add maybe 3/32 inch of downthrust, you can stop the climbing tendency somewhat, or you can shim the leading edge of the wing downward by about 1/16 inch. This will help to maintain neutral trim throughout the flight.

If you decide to buy a Skyraider, you're in for a treat in many ways. You'll enjoy building it; you'll love the way it flies; and you'll have fun with the color schemes, too. Just pick up a copy of Squadron/Signal's no. 60 Skyraider "In Action" book, and check out the data and color schemes. I bet the anticipation of flying such a neat airplane will get those juices flowing.

**Addresses are listed alphabetically in the Index of Manufacturers on page 127.* ■

FIELD & BENCH REVIEW

FUTABA

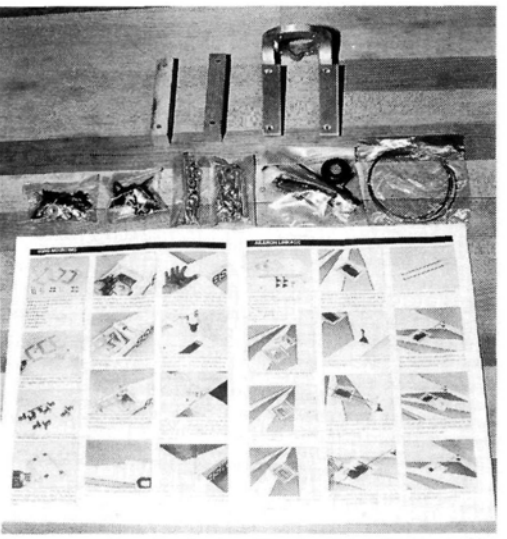
ACRO 120

by VIC OLIVETT

Futaba's* Acrostar 120 is a 72-inch-wingspan, semi-scale version of the highly innovative plane that was designed, built and flown by Arnold Wagner, a member of the Swiss aerobatic team in the early '70s. Designed specifically for aerobatics (with a fully symmetrical wing), the Acrostar was the first full-scale plane to have flaperons and coupled elevator and flaps (control-line models were the first to have coupled flaps and elevator). Before going on to the World Championships, the Acrostar won a double victory at the Swiss Championships in 1970.

Like the smaller, .60-size version, Futaba's 1.20 Acrostar is also a highly aerobatic, semi-scale ARF that's made with modern ARF construction techniques—an inner plywood/balsa structure with a skin made of three laminations. A pliable plastic-foam base is covered by a paper skin, which has the Acrostar's color scheme printed on it. The skin's outermost layer is clear Mylar, which is fuel-resistant and also resistant to cleaning solutions. The inner surfaces are, however exposed at the edges. Be very careful not to allow thinners, solvents, gasoline, or strong cleaning solutions to touch these areas because some can easily dissolve the foam and ruin your model.

The author and the Acrostar 120 on a takeoff run. This tail-dragger is very well-behaved on the ground.



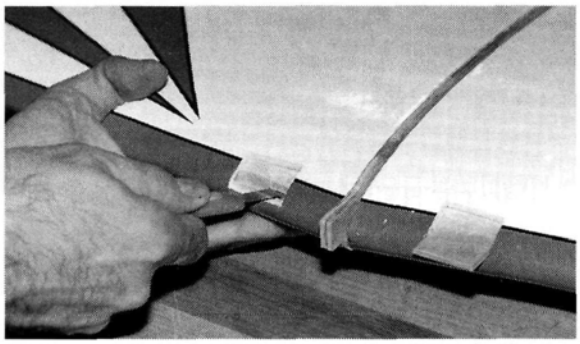
The comprehensive instruction booklet, high-quality hardware and well-thought-out parts packaging make this ARF a pleasure to assemble.

fer a specific brand of hardware item and simply wouldn't feel comfortable without it. I'm very finicky about spinners. If I love a certain model, it gets a Tru-Turn* spinner, so I've ordered one for the Acro (that says much about my feelings for this model). I used every other piece of hardware that came with the kit; it's all of good, often excellent, quality.

My club—the Flying Knights of Troy, NY—has more than 100 members, so I've probably been exposed to almost every ARF out there. I can honestly say that this model it the best of the best! Every aspect, from the parts fit to the quality of the hardware, is topnotch.

The well-written, well-illustrated construction guide contains more than 130 photos. If this is your first ARF, read it a few times because not only will you find constructing an ARF a new experience, but mistakes can be very difficult—if not impossible—to correct.

The kit comes with everything you need except a radio, engine and prop. The plywood and balsa are well-cut and of a very good grade. The parts for each construction step are conveniently packed together, so construction is a well-organized, tidy procedure. Once again, the hardware packages include everything you'll need. Your only reason for running to the store is that you might strongly pre-



Making a cut-out for the front wing-bolt blocks. This step requires very careful measuring and cutting. Do NOT rush! (see article).

SPECIFICATIONS

Model name: Acrostar 120
Type: semi-scale aerobatic
Manufacturer: Futaba
List price: $549.95
Wingspan: 67.5 in.
Wing area: 800 sq. in.
Weight: 9.25 to 9.50 lb.
Wing loading: 26.4 to 27 oz./sq. ft.
Airfoil type: symmetrical
Washout built into wing?: no
Length: 44 in.
Rec. engine: .90 to 1.08 2-stroke or 1.20 to 1.60 4-stroke
Engine used: YS 1.20
Prop used: 14x11 and 15x10 APC
No of channels req'd: four with five servos
Radio used: Futaba 8-channel 8SSA single stick

Features: the wing and fuselage are made of a triple laminate (foam-board, cardboard, Mylar) over an inner structure of plywood and balsa. The entire finish, including the stick-on instrument panel, is completed at the factory. All the hardware—control rods, adjustable horns, universal engine mount, tank, spinner, wheels, tempered main landing gear and steerable tail wheel—is included in the kit.

Hits
- Kit is of high quality.
- All the hardware is included.
- Comprehensive construction guide is excellent.
- Flight performance is outstanding.

Misses
- Stiffer springs or solid replacement rods are needed on the tail-wheel assembly for more positive steering off grass.
- Disagree with vertical-fin-attachment method (see main text).

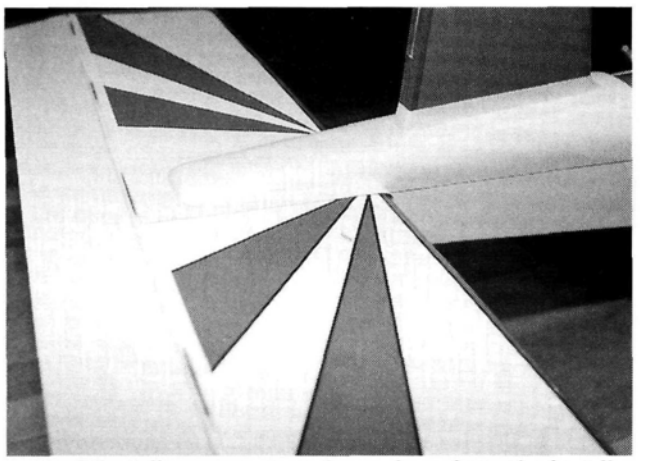
CONSTRUCTION

I won't go through a step-by-step account of construction; the 15-page booklet does that job much better than I could in this limited space. I will, however, touch on a few points.

I used Pacer Technology's* Zap glues throughout—thin Zap for the plastic parts; thick for the hardwoods, and Z-Poxy for high-stress joints like dihedral braces. I've used Pacer products for years and have found their quality consistent and their shelf life long.

The wing is assembled using two plywood center ribs and a three-piece balsa-and-plywood dihedral brace. Four wing bolts are used, and on the center plywood ribs, there's a tab that's designed to key into the bottom of the fuselage former at the front of the wing saddle. This combination of four wing bolts and leading-edge key-tab ensures a solid and well-aligned joining of the wing and the fuselage—very important for a precision aerobatic design.

Trial-fit the right and left wing, making sure that there isn't a gap between them. If there is a gap, you'll have to carve or sand the dihedral brace until you have a perfect fit. When you're satisfied with the fit, epoxy the root ribs and the joiner, slide the two wings together, wipe off the excess glue, and hold the wings together with tape until the epoxy has cured. I suppose you could use Slo-Zap for the dihedral braces; many argue that it's strong enough, and I'm sure it is; but you get one shot to get everything absolutely straight. If you don't succeed, you're in real trouble; I'd stick with the Z-

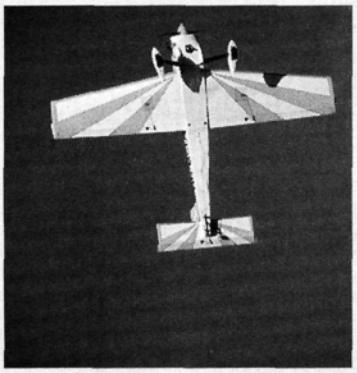


The fit of the tail-group root cap is nearly perfect—the best I've seen yet!

FLIGHT PERFORMANCE

by CHRIS CHIANELLI

Having heard the smaller .60-size Futaba Acrostar was a fine performer with smooth aerobatic characteristics, I was looking forward with optimism to the flight-test day. The YS 120 (non air camber) was well broken in on the bench and has proven to be a very powerful performer with one of the most reliable idles in the business. I found that an O.S. F plug gives noticeably better throttle response and idle than any other plug I've tried. Don't be put off by the wet, "puffy" idle. This engine, not unlike other 4-stroke engines I've encountered, really likes an idle setting that's on the rich side. Transitions from idle to high speed were always hesitation-free as long as the O.S. F plug was used. I love the YS 120, and it's certainly a perfect match for the Acrostar. At 9.5 pounds., I don't think the air-camber version of the YS 120 is needed for this model.



The bright, high-contrast pattern on the bottom really helps the pilot stay oriented with the plane—a real confidence-builder.

• Takeoff and climb-out

Ground handling is great on pavement, and just OK on grass. The problem is the spring-loaded tail wheel. The springs are too soft for rough grass. The simple solution is to replace the springs (one on each side of the two-sided control horn) with a single, solid, rod link on one side. You could also try to find stiffer springs. If, however, you fly only off pavement, the stock set should work well enough. The wheel pants setup never gave me one problem, even on grass. The model never showed a hint of a tendency to nose-over. Ground handling is beautiful, even in gusty conditions, and the takeoff run needs only minor rudder input. Both of these features are due, in part, to the larger size and good tail moment of the Acrostar.

Because of the relatively low wing loading (for a model of this size) and the power of the YS, the Acro can hop into the air with ease. Add this to one very effective elevator that spans the length of the horizontal stab with no breaks, and you could find yourself in an emergency situation, as I did. Before one of my takeoffs, I had knocked the elevator dual rate into the "high" position without realizing it. During the takeoff run, a slight back-pressure on the stick sent the Acro skyward as if it were a Fiesler Storch—no, more like the space shuttle! A quick application of some down-elevator had things straightened out without a hint of a stall. That YS power came in handy, too. I feel the very effective elevator surface screams for some exponential control—something I like much better than dual rates anyway. At any rate, no pun intended, the Acro is great at doing those very scale-like, tail-high, flat takeoffs. Looks pretty, too.

• Trimming

Except for a few clicks of down- and right rudder, the model was very close to being trimmed out on the first flight. Taking the extra time to measure things during building really pays off (and, of course, the kit parts are built accurately to begin with). One thing is glaringly apparent: owing to the excellent hinging job the manufacturer has done (no gap), the ailerons and elevator are very sensitive around neutral. The use of dual rates would help out here; exponential—in my opinion—would be even more helpful because this function makes responses smooth around neutral and wild at extreme stick movement without your having to fiddle with microswitches! (just my opinion)

• Stalls/low-speed flight

For a plane of this type, this design is incredibly forgiving at low speeds. Corn-stalk-high, ¼-throttle, slow figure-8s—with very little wind of course—are relaxing (even inverted!). The wing simply hangs in there. With a lighter engine, things would just be that much more forgiving. Remember, however, I said, "for a design of this type."

• Stalls/high-speed flight

If this plane were balanced *slightly* nose-heavy, which it isn't, I wouldn't be surprised if it tried to fly through high-speed snap-rolls. Though snap rolls were beautifully majestic—almost slow-motion—like—they did take full control deflection. I never did get it to snap out of a tight loop—inside or out—or a high-speed, pylon-racing-type turn. Maybe I need to try harder!

Chris with his Futaba 8SSA PCM single-stick.

• Speed range

There's something about this airfoil. For a pattern design, it's fast and low-drag. The airfoil is slightly—and only slightly—on the thin side, yet it's capable of the slow, low 8s I referred to earlier. They've really got this one right. With lots of prop pitch, such the APC 14x11 I used, the Acrostar is quite fast, even with the non air camber YS 120.

• Aerobatics

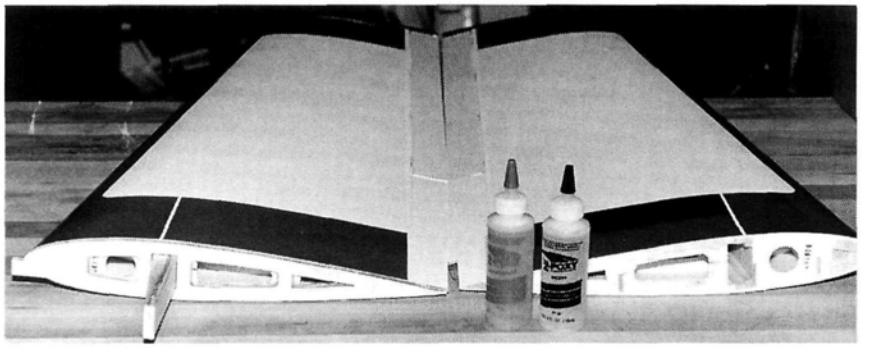
Ah, yes, aerobatics!—the task for which this machine was created! When the throws are just how you like them, this Acrostar can make you look like an air-show pro. Initially, I set the throws up according to the instructions: ailerons 3/8 inch, elevator 5/8 inch and rudder 2 -inches (these numbers represent movement in one dimension only). Later, I added a touch more throw, but I was absolutely certain to dial in exponential to civilize things around center. I like to fly turnaround style, close in and low, in a relatively small box—not in an attempt to show off, but simply because my eyes dictate I do so. The Acrostar excels at this type of flying, and it certainly instills the confidence to do so. Square loops, Cuban-8s, stall turns with outside recoveries are beauties to behold (also much easier to behold close in and low, I might add). For the slow, throttle-off "down-leg" portions of the maneuvers, I went to a 15x10 APC. The larger diameter really seemed to improve the "disk effect," slowing the down-leg even more (truly beautiful). As far as higher altitude and high-speed maneuvers go, it's all there: knife-edge, avalanches, torque rolls—you name it, the Acrostar can do it if you can. Recovery from a snap roll is immediate, with no over-rotation after you've learned when to neutralize the sticks. Spin recoveries are also immediate; the model never goes more than one extra full spin after the controls have been neutralized. The Acrostar is a fun, predictable relaxing aerobatic model to fly.

• Landings

The mandatory maneuver for all! The Star has a good glide and a very predictable sink rate, so it's a sweetheart on final—as long as you don't try to mush it around like a semisymmetrical-airfoil, low-wing, intermediate trainer. Let it sink to hit the mark. If things look as if they're going to fall short, don't worry. Go ahead and add power; that long tail moment and big fin/rudder will keep things in line. The 800 square inches of wing area help, too! When just over the deck, flaring for a three-pointer is fairly to do most of the time. The big main gear can make you bounce now and then, but not nearly as bad as some models I've seen. I think the mains being slightly more forward than on other designs may helps out here. That low-drag airfoil I mentioned earlier can cause the plane to overshoot in dead wind conditions. Again, going to the larger-diameter, lower-pitch, 15-inch prop helped in no-headwind landings.

Poxy for this one. It's extremely strong and allows ample working time.

For an instant bond, use the thin Zap to glue on the wing covers. Use very little Zap to bond the plastic parts; if you use too much, it will run and make a mess. Step 17 in the wing-assembly section deals with installing hardwood blocks in the leading edge for the front wing-bolt heads to rest c
There's a bit of cutting and measuring to d
and it's a very critical area, so take all t
time you need to measure and cut thin



The parts for joining the wings (plywood root ribs and dihedral braces and balsa dihedral wedge brace) all fit perfectly; only minor trimming of the dihedral brace ends was required. For strength, 30-minute Z-Poxy was used here; it's great stuff. Note: do NOT thin it with denatured alcohol, because it can make adhesives feel rubbery when they're cured.

carefully. *Take your time!*

There are two wing mounting blocks—one front and one rear—and each holds the blind nuts that accept the wing bolts. Take the time to fit and install these blocks carefully; they key into the fuselage sides snugly. When the glue on the blocks has fully cured, screw the wing bolts into the blind nuts until they're almost inside the fuselage. Put a spot of paint on the head of each wing bolt. Place the front tab of the wing center rib in the notch of the front bulkhead; then push the wing's trailing edge onto the heads of the wing bolts, press down tightly. The paint will mark the points on the inside of the wing where the wing should be drilled for the bolts. Again, take your time here, too.

The Acrostar uses two servos for the ailerons, and the kit includes pushrods and three-bolt control horns. This is a good-quality linkage system that provides positive control.

The landing-gear installation is straightforward, but I had to re-drill the wheel pants to make them fit properly. Made of tempered aluminum, the landing gear has survived a full season of flying without bending.

Futaba provides a good-quality universal aluminum engine mount. The engine-mount bolt holes are pre-drilled in the firewall. It turned out that the engine was perfectly aligned 0/0 degrees to the datum line. I drilled the plates for the YS* 120 and bolted them to the mount.

TAIL FEATHERS

The horizontal stabilizer's plywood mounting plate is glued inside the rear of the fuselage flush with the stab saddle. (I used epoxy for this step.) Mounting the stab is straightforward; but if you want a really true model, it's a good idea to measure from the tip of the horizontal stab to the tips of the mounted wing. It's also important to center the stab and line it up so that it's absolutely parallel to the wing. Truing things up tip to tip will make the difference between building a Sunday-fun sport plane and a pattern ship that will give you aerobatic flights you can be proud of.

I don't agree with the way they tell you to install the vertical stab! In steps 5 through 7 (stabilizer assembly), the instructions say you should glue the two triangular balsa reinforcements to the bottom of the vertical stab and then glue the assembly to the plywood stab plate—no! If you first tack-glue the vertical fin to the stab plate with just two or three drops of Slo-Zap, it's easy to check that the vertical fin is absolutely square to the horizontal stab. If it isn't, adjustments are easy to make—before the triangular reinforcements have been put into place. Having trued up the fin and stab and ensured that they're perfectly square, you can *then* glue in the triangular stock to ensure a solid union.

When the horizontal and vertical stab have been completed, the top root cover is glued on with thin Zap. I must say, I've never seen a root cap fit so perfectly in any ARF before. It was quite amazing.

The rest of the construction is relatively foolproof, and the Acrostar was a joy to build Just a few words about CG: when I checked it with the YS 120, the aircraft was nose-heavy, and I positioned the 1200mAh battery pack in the rear of the fuselage, well behind the rear of the wing saddle, to correct this. I had to cut a small hatch in the rear of the fuselage and build a small box to hold the pack. This put the CG right on the mark.

My club—the Flying Knights of Troy, NY—has over 100 members, and I've probably been exposed to almost every ARF out there. I can truthfully say that this model is the best of the best! Every aspect—from the parts fit to the quality of the hardware—is topnotch.

As for flight performance, the Acrostar 120 is a majestic athlete in the air and a sweetheart on final.

**Addresses are listed alphabetically in the Index of Manufacturers on page 127.* ■

A closer look at Dave Platt's Mohawk flaps

The author w his Grumman Mohawk OV-1 which feature working Fowl flaps. Sad to it was destroy in a midair at Top Gun '94.

Those Fowler Flaps

by DAVE PLATT

Editor's note: because of high interest in Dave Platt's Mohawk flaps write-up in the September '94 "Top Gun" report, we asked him to explain his system in more detail.

SEVERAL VERY appealing aircraft would make good scale models, but to be accurate, they'd have to have Fowler flaps. One plane that readily comes to mind is the Me 262 jet fighter; another is an even better-known subject—the Republic P-47 Thunderbolt. Equipping such models with the right flaps is not just a dream; certainly, accurate work is needed, but real Fowler flaps are within the reach of any careful scale modeler.

I have included a perspective drawing of the entire flap area, along with all linkage and drives (see Figure 1). As a familiarization trip, let's describe each part's purpose and get to know what we called them all.

A Rear beam. This is the fixed vertical surface of the wing to which the flap mounting components are attached. Normally, this will be a "C" beam, meaning a pair of surface spars with a one-piece vertical web glued to their rear. Figure 2 shows the usual design.

The important thing to notice about the rear beam is that it is placed at a constant-percentage point along the chord; for example, if the rear face of the rear beam is at the 67-percent-chord point at the root, it's at the same 67 percent of the chord at the tip end. Indeed, all the components of the Fowler flap ordinarily share this "constant percentage" feature. Though it's possible to design Fowlers that do not meet this criterion, it is easier to comprehend the workings when the percentages are constant.

B Drive arm. This is the L-shaped arm that actually does the work of moving the flap. Normally, one flap has a drive arm at each end. Notice that the arms only push the flap *back*. They do not cause the downward travel.

C Bellcrank and link. A bellcrank is mounted in the wing, forward of each drive arm. The link connects the bellcrank and the drive arm; the other leg of the bellcrank is, of course, connected to the flap servo.

D Drive arm/flap hanger mount. Thi is a fixed structural component that' glued to both the rear beam web an the inside of the top wing skin. The mount can be made of ply, carbon laminate, phenc lic, etc. As shown in Figure 1, the mounts ar paired, and the drive arm and flap hange dangle between them.

E Flap hanger. As its name implies this is the piece on which the flap literally hang. A groove will b required in the flap's upper forward skin t allow clearance for the hanger's arc of move ment. The upper end of the hanger is hinge to the rearmost hole in the mount, while th lower end is hinged to a pin in the flap' lower surface.

F Flap peg. There is a short arm tha projects like a peg from the leadin edge of the flap. This peg is connecte to the drive arm with a small machine screv For the sake of accuracy of workmanship, i my Mohawk, I extended this peg rearward making it of sufficient length to pick up th hole for the flap hanger pin. In this way, made one piece serve two important func tions and ensured proper hole alignment.

Other than the flap itself and the variou screws, nuts, etc., that's all the required hard ware. Oh yes!—that downward motion w spoke of earlier: the flap's downward ang arises from its being hun from one fixed spot whi being driven backward. you like, cut out some piec of card, hinge them wit ordinary pins, and watch ho it all works. Magic!

PHOTOS AND ILLUSTRATIONS BY DAVE PLATT

Figure 1. View of Fowler drive mechanism.

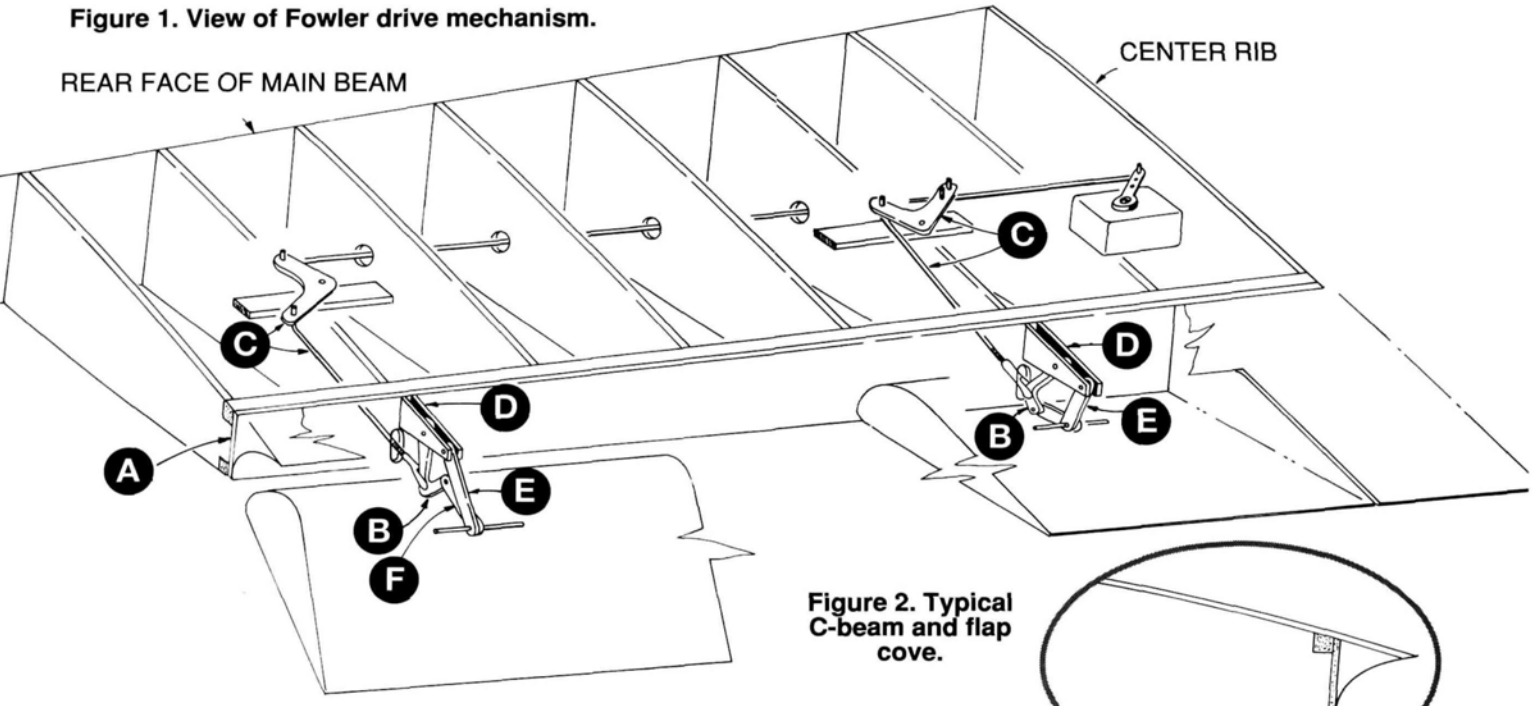


Figure 2. Typical C-beam and flap cove.

MAKING THE PARTS

The "Top Gun" feature in the September 94 issue mentioned that excellent workmanship is vital if the flaps are to function smoothly. Although this is true, it isn't as difficult as it might seem.

Here's how I went about it: first, I made large (but to scale) drawing of the entire flap geometry. This drawing was published in the September issue, and it's repeated here in Figure 3. Just for interest, September's drawing scaled out to a 15.9-inch chord value. The drawing this time works out to an even 20 inches. This drawing was then scaled down photographically to the chord values of the Mohawk at the points where the flap mechanics are.

The actual parts (wing bellcranks, drive-arm mounts, flap hangers, drive arms and flap pegs) were cut out of phenolic using the actual-size photo reductions pasted down as templates. Center-punch all the holes with a sharp awl before drilling them. Also, get the correct drill bits for the screws you're using. You simply cannot get the tight accuracy necessary using a drill bit of the nearest size fraction.

Although I used a single servo in my first Mohawk, this was done for weight conservation rather than from choice. (The FAI weight limit is 15 pounds.) In the new model, which is not for FAI and is somewhat larger, we have one servo for each flap, and this should be considered the favored way of working.

When rigging the bellcranks in the wing, make sure that the servo will drive both cranks to the same angle as in the plan view (for example, 40 degrees to each side of neutral). Thus, the "driven" crank legs will all be the same length. However, observe that to match the linear distance required by the travel of the drive arm, the hole in the bellcrank's "idle" leg will have to be drilled in exactly the right spot. Measure your actual-size drawings to find out where this is to be.

One last point: if provision is made for this, the flaps can be made to be removable from the completed wing. In my Mohawk, they're this way. If the flaps can be removed, it will be much easier to make the flaps and to construct and finish the flap cove. (The flap cove is the concave part of the wing where the leading edge of the flap fits in its retracted position. The cove also provides proper airflow when the flaps are extended.)

So, now, who'll be the first with a *correct* P-47? ■

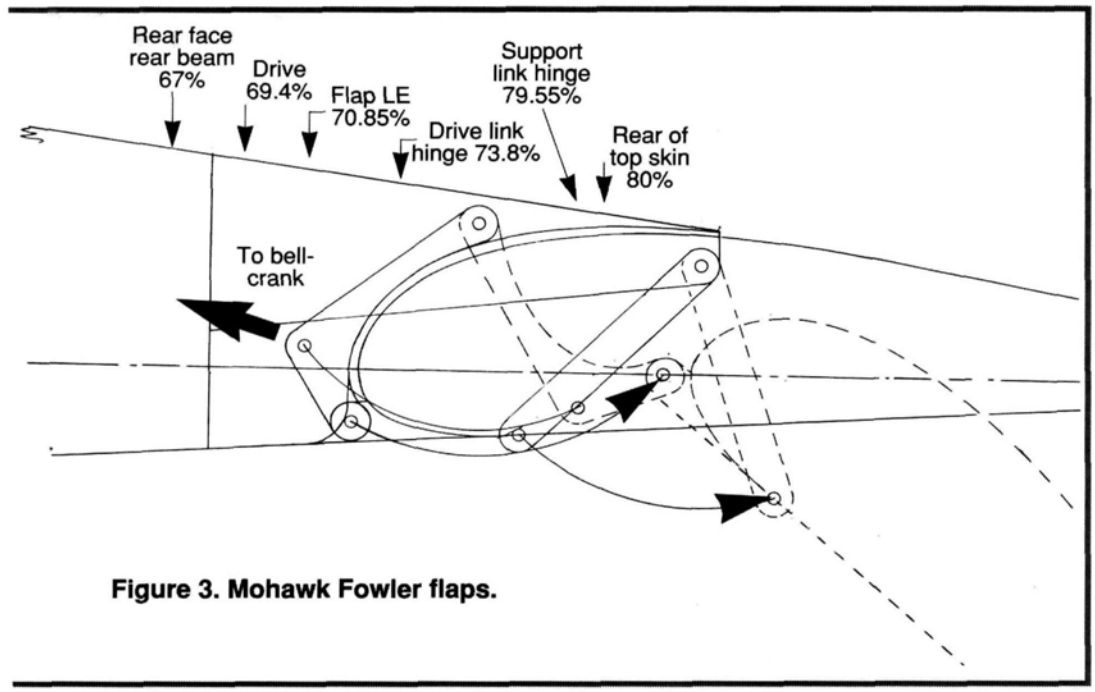


Figure 3. Mohawk Fowler flaps.

ENGINE REVIEW

A modern, durable 2-stroke ideal for ¼ scale

The large, robust radial mount is ideal for mounting on a firewall. Its chunky, solid construction is shown clearly here.

Moki 1.80 R/C

by MIKE BILLINTON

INTRODUCED in the 1960s, the finely produced, Hungarian, Moki engines are now distributed in the USA by Gerard Enterprises* of Wisconsin.

The subject of this review—the Moki 1.8ci (30cc) single-cylinder, 2-stroke, glow-plug engine—is ideal for ¼-scale projects such as Midwest's* 80-inch-span 300S (all-up weight, 14.5 pounds; scale is actually 27 percent of the full-size version).

In addition, it's likely that the FAI will remove restrictions on engine size in international aerobatics events, so all engines will be possible candidates. Realistically, though, FAI size/weight restrictions on models (they must not weigh more than 11 pounds and must fit inside a 2-meter box) will limit engine size—as will the need to satisfy the judges with regard to noise. These limits are being earnestly considered by engine manufacturers and competitors, and the outcome is uncertain. It's certain that the 4-stroke will lose the capacity advantage it has enjoyed over the 2-stroke for a few years, but this need not lead to its demise.

The 4-stroke's flat torque characteristics admirably suit the requirements of aerobatics. During the load-reducing stages of maneuvers (down-legs, for example), the 2-stroke tends to produce unpredictable rpm increases. By now, a more precise use of the tuned pipe could have eliminated this tendency. (Using pipe that's slightly too long would mea that any sudden rpm increase would mee head on, as the post-peak decline sets in, rapid decline in torque that would prever rpm from increasing.) Operators are usin the correct lengths to obtain maximu power when airborne, but if they used slightly longer pipe, they could sacrifice little power (by deliberately allowin the engine to operate in the post-pea area) and thus prevent rpm fro increasing when, in certain attitude load is diminished.

Example: this Moki 180 on a lon pipe. To limit the increase in rpn operate it at 8,500 to 9,000rpn Operations in that post-peak area a usually very stable; it isn't obviou that the engine is actually some wa past the best resonance point 7,000rpm; and the surplus power th the large 2-stroke has over the 4-strok will surely allow a slight sacrifice power.

Note that the main crankshaft has been strengthened in front of the crankweb, and the parts finish is of high quality. The front and rear covers that go to the lower crankcase don't have gaskets.

MECHANICAL DETAILS

The Moki 180's structure is imposin it was clearly designed to withstar

high torque and power when fitted with a tuned pipe. Central to its design is the robust crankshaft, which features an unusual increase in diameter between the crankweb and the induction slot.

The crankcase was carefully designed; unlike many 2-strokes, the Moki 180 has fully flowed transfer passages (this also strengthens the case's bottom).

The short, strongly constructed, separate front housing further increases the rigidity of the entire crank assembly and looks able to deal with even more power than the manufacturer claims.

A heavy-duty, ringed, aluminum piston runs at a 0.003-inch clearance in a satin-chromed steel liner. This incorporates standard Schnuerle porting, but without the more usual boost port opposite the exhaust port.

The modest cylinder timings are in keeping with the anticipated relatively low rpm, but the front induction has a surprisingly late closure point of 63 degrees ATDC—more typical of high-rpm engines with outputs in excess of 18,000rpm.

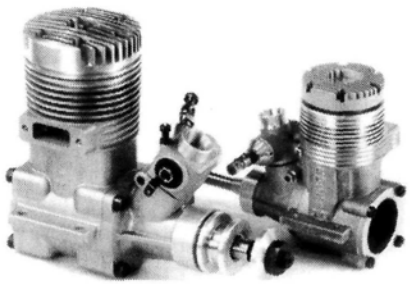
The cylinder head features a high-angle squish band and a large-volume combustion chamber that combine to give a fairly low effective compression ratio of 8.3:1. One result of this is the engine's unusually good hand-starting characteristics; power levels could be pushed higher if the compression ratio were increased.

The carburetor features a main fuel needle that's sensibly angled back well away from the spinning prop; adjusting the secondary, mid-range/low-end idle-control disk demands the usual care to avoid the propeller arc. This secondary metering device is operated by being rotated slightly (no more than 15 degrees either way) around a tapered slot in the steel throttle barrel.

Also available is a well-engineered radial mount that weighs in at an extra 6 ounces and has three, 3.9mm, equidistant mounting holes. The bare engine—minus any pipe or muffler—weighs 2 pounds, 9 ounces.

PERFORMANCE

The first line in the instruction leaflet stresses that ringed Moki engines have hard-chrome liners and, because of this, they require extended break-in—two hours or more for the best results, and never less than 30 minutes. For your trouble, you'll have a very long-lasting engine.



For comparison, the Moki 180 is shown here with the Rossi 65 heli engine.

Moki isn't too happy with straight synthetic oils and would prefer that you use *only* castor oil; if you *must* use synthetic oils, a 50/50 castor/synthetic mixture is recommended. The natural-versus-synthetic oil controversy rumbles on...and on! I still don't know what we'll do when the castor bean crop fails; will it mean the end for engine manufacturers who eschew synthetics?

Clearly synthetic oils aren't all equally effective in our model engines—nor are the natural oils—linseed, olive, etc. Experience tells us that the best natural oil is castor; eventually we may be able to decide which is the best synthetic, but there are so many, and it's hard to use your own engine as a test bed for a new oil when you've already been successful with a certain blend. It seems inappropriate to take any position too strongly.

I successfully broke in the Moki 180 on 10 percent castor and 10 percent ML70 synthetic; then, having completed break-in, I reduced the fuel's oil content to 16 percent (still equal proportions of castor and synthetic).

Using a variety of props, I obtained rpm ranging from 4,910 to 10,650. Higher rpm would have been possible, but I wanted to preserve the engine for the main pipe tests, so I didn't push it.

TESTS

• **Test 1. Open exhaust**—*fuel, 5 percent nitro/8 percent castor/8 percent ML70 synthetic oil; Moki long-reach idle-bar glow plug.*

—Maximum torque occurred at 6,600rpm.

—Maximum horsepower, 3.72 at 9,910rpm.

These figures confirm the relatively low-rpm operation being sought by the Moki's manufacturer.

Sound Tests

Decibel Readings

		Wind → 6mph			
Distance from engine	Mac's pipe—long 20x10 Top Flite 7,450rpm	105	103	102	102
9 feet AMA/USA	Bisson Pitts muffler 20x10 Top Flite 6,600rpm	103	100	99	102
7 meters BMFA/UK	Mac's pipe (as above)	98	97	95	98
	Bisson muffler (as above)	98	92	94	93

Engine: Moki 180 R/C

Equip: Mac's tuned pipe and Bisson muffler

Fuel: 5% nitro

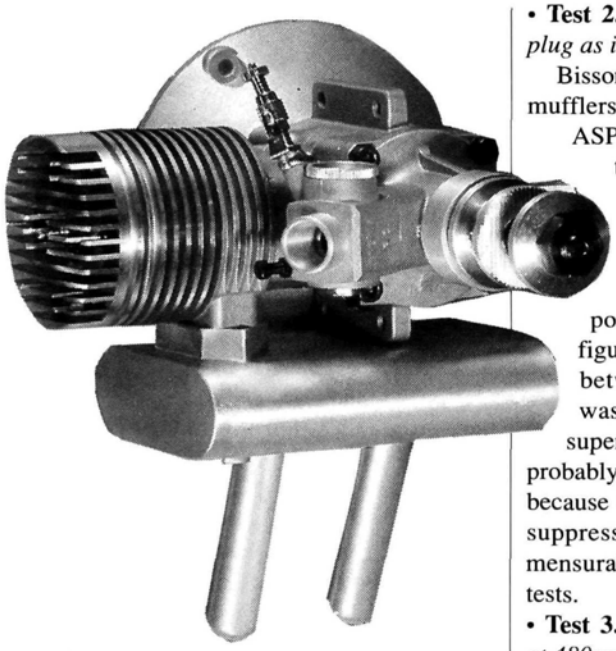
Temperature: 56° F

Location: outdoors, next to farmland

Sound meter: Radio Shack (no. 33-2050) using GA601 calibrator set to NPL standard.

Height: sound meter and engine set at 1 meter above concrete

dB meter



Fitted with a Bisson Pitts muffler and radial mount, the Moki 180 weighs 3 pounds, 2 ounces.

• **Test 2. Bisson (Pitts) muffler**—*fuel and plug as in Test 1.*

Bisson of Canada makes light aluminum mufflers for the Webra 120, Zenoah G38, ASP 108, O.S. 108, etc. I used the one that's specifically made for the Moki 180; it's a handsome, practical muffler that fits snugly against the engine. As expected, it did reduce torque and horsepower (relative to the open-exhaust figures), with an interesting exception: between 3,750 and 5,000rpm, there was a tuned-pipe effect that allowed superior figures to be reached. This is probably of little practical value, however, because at those rpm, horsepower is really suppressed. Fuel consumption was commensurably less than in the open-exhaust tests.

• **Test 3. Mac's Q tuned pipe**—*length set at 480mm from exhaust flange to first maximum diameter; fuel and plug as in Test 1.*

I hadn't used a Mac's pipe for a while, so I was interested in seeing how their latest pipes operate. This particular pipe may be used for engines with capacities that range from 30 to 48cc (1.80 to 2.90ci), and its volume is relatively large for the Moki 180.

Past tests revealed that "over-large" pipes increase power and that slightly under-size pipes often suppress performance. This makes sense because the smaller the pipe volume, the more it acts as just a restriction—to the point at which the acoustic wave has barely enough room to be effective, even though the tuned length may be just fine.

My operating length results from my use of the standard, uncut, exhaust manifold provided by Mac's. To some, this might seem too long, but in the tests, maximum resonance appeared at 7,020rpm and horsepower figures were relatively flat up to 8,500rpm. This seemed to be a very suitable

SPECIFICATIONS

WEIGHTS & DIMENSIONS

Capacity	1.8138ci (29.72cc)
Bore	1.377 in. (34.9758mm)
Stroke	1.218 in. (30.937mm)
Stroke/bore ratio	0.884/1
Timing periods	Exhaust—150° Transfer—118° Front induction— opens 43° ABDC —Closes 63° ATDC —Total period: 200° —Blowdown 16°
Combustion volume	2.8cc
Compression ratios	Geometric 11.6:1 —Effective 8.3:1
Exhaust-port height	0.38 in. (9.7mm)
Cylinder-head squish	0.020 in. (0.5mm)
Squish band width	0.193 in. (4.9mm)
Carburetor bore	0.393 in (10mm)
Crankshaft diameter	0.904 in. (22.98mm) 0.984 in. (25mm) adj. to crankweb
Crankshaft bore	0.631 in. (16.03mm)
Crankshaft nose thread	0.392 x 25.4 in. TPI (10x1mm)
Wristpin diameter	0.314 in. (8mm)
Connecting-rod centres	2.20 in. (56mm)
Engine height	5.5 in. (140mm)
Width	3.145 in (79.9mm)
Length	4.94 in (125.6mm)
Width betwen bearers	2.24 in (56.90mm)
Mounting-hole dimensions	2.68 x 1.44 x 0.197 in. holes (68 x 36.4 x 5mm holes)
Exhaust-manifold bolt spacing	1.34 in. (34mm)
Frontal area	12.8 sq. in.
Weight	Bare: 2 lb., 9 oz. (1,162g.) —with Bisson (Pitts) muffler: 2lb., 14.5 oz. (1,318g.) —with Mac's Q pipe and manifold: 3lb., 5.5 oz. (1,517g.)
Crankshaft weight	9.40 oz.(267g.)

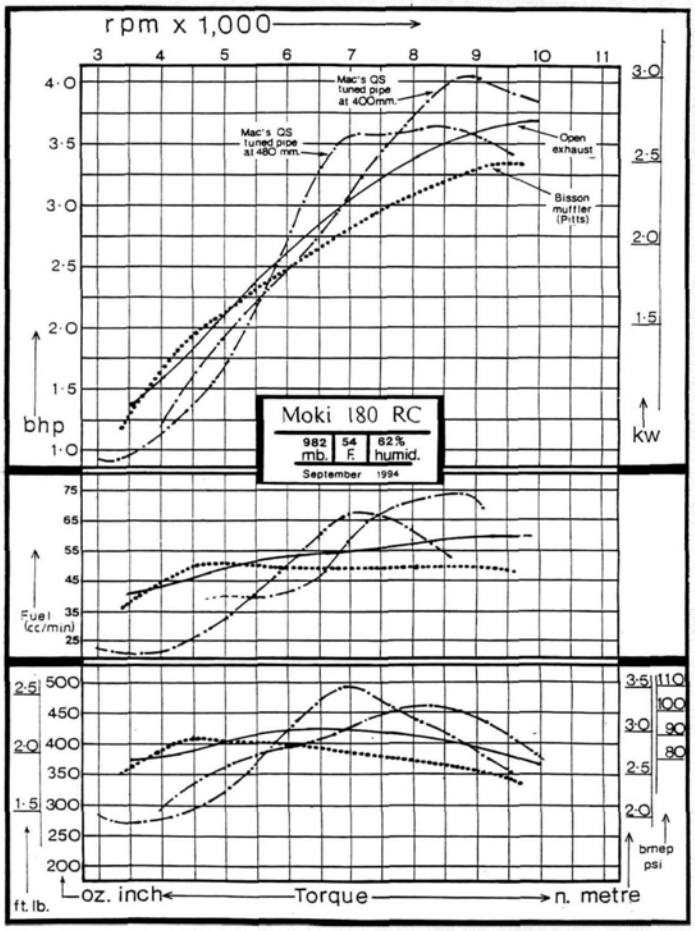
PERFORMANCE

—Maximum b.hp
4.03 @ 8,730rpm (Mac's Q pipe at 400mm/5% nitro)
3.72 @ 9,910rpm (open exhaust/5% nitro)
3.36 @ 9,370rpm (Bisson Pitts muffler/5% nitro)

—Maximum torque
496 oz.-in. @ 7,020rpm (Mac's Q pipe at 480mm/5% nitro)
420 oz.-in. @ 6,600rpm (open exhaust/5% nitro)
410 oz.-in. @ 4,600rpm (Bisson Pitts muffler/ 5% nitro)

Propeller rpm	Open exhaust	Bisson muffler	Mac's Q tuned pipe at 480mm	Mac's Q tuned pipe at 400mm
24x8 Airflow	4,910	4,840	5,020	—
24x8 Zinger	5,910	5,680	6,225	—
20x10 Mastro	6,048	5,810	6,230	6,030
20x10 Top Flite	6,870	6,690	7,510	7,220
20x10 Kavan	7,420	7,320	7,890	7,830
20x8 Top Flite	7,820	7,600	8,250	8,300
18x10 Bolly (3-blade)	—	7,820	8,360	8,500
18x7 Mastro	8,240	—	—	—
20x6 Zinger	8,580	8,260	8,620	8,910
16x12 APC	9,330	8,990	9,355	9,600
16x6 Merati	10,650	10,260	10,260	—
Peformance equivalents				
B.hp/ci	2.050	1.850	2.000	2.220
B.hp/cc	0.125	0.113	0.122	0.135
B.hp/lb.	1.450	1.160	1.090	1.200
B.hp	3.200	2.550	2.400	2.660
Oz.-in./ci	231.500	226.00	273.400	252.500
Oz.-in./cc	14.130	13.800	16.690	15.340
Oz. -in./lb.	164.00	141.000	148.300	136.300
Ft.-lb/ci	1.210	1.190	1.400	1.290
B.hp/sq. in. frontal area	0.290	0.153	0.254	0.282

Manufacturer: Moki Ungarn, H - 1253, Budapest, Hungary, P.F.54.
Distributor: Gerard Enterprises Inc., W226 N 825 Eastmound Dr., Waukesha,WI 53186; (414) 521-0547; fax (414) 521-0551.



Dynamometer Test Results

rpm range for this engine, and it certainly provided very high torque in the 7,000rpm area. The ideal load seems to be, for example, a 20x10 Top Flite. Does this seem too staid for your aircraft? Only you can decide just where you want rpm to be pitched and, therefore, which propeller you need. Then adjust the pipe's length and go for it! In that spirit, the final test provided the necessary information.

• **Test 4. Mac's Q pipe**—*length set at 400mm; fuel and plug as in Test 1.*

It's easy to shorten the Mac's pipe manifold by 30mm (3 inches) because it neatly slides inside the Q pipe; cutting isn't necessary, and you can swiftly go back to the original length when you've exhausted the possibilities of the shorter one.

The results were predictable: a higher rpm maximum resonance point; lower maximum torque, but higher horsepower figures; and it's now really a 9,000rpm machine that's operated at above 8,000rpm when on the ground. A 20x8 Top Flite is the sort of load needed.

• **Noise tests**—*using the 20x10 Top Flite prop, pipe pressure to the fuel tank and the Pitts muffler and Mac's Q pipe at their longest.*

As the chart shows, the decibel readings indicate a sound level that's only just made acceptable by the use of the lower rpm areas. If you use the higher power of the tuned pipe, you must expect an increase in dB levels.

Using the same prop, pressurized fuel system and long Mac's pipe, the Moki 1.80 idled easily at 1,700rpm following a 10-degree movement in the negative (lean) direction.

SUMMARY

The Moki 1.80 is finely constructed to high modern design and manufacturing standards. Its solidity suggests a considerable operational life and inspires confidence in its operation. Needless to say, at the end of my tests, it didn't show any signs of wear or weakness.

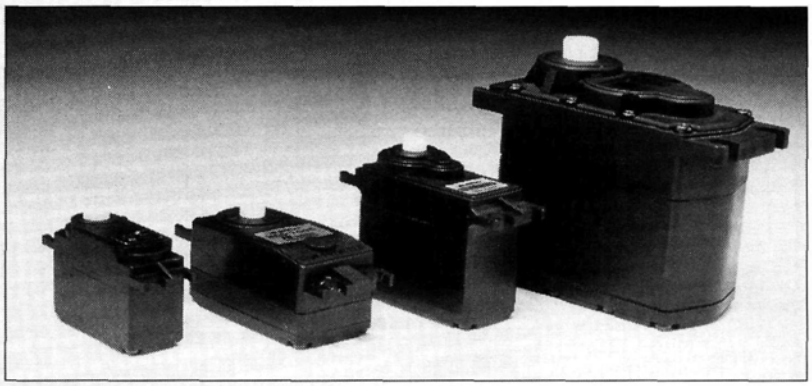
**Addresses are listed alphabetically in the Index of manufacturers on page 127.* ■

Model Airplane News

Servo Guide

What you need to know at a glance

by FRANK MASI



IF YOUR transmitter is "management," think of the servos as "labor." A servo does all of the work, converting control impulses from the receiver into precise, mechanical movement. Choosing the right servo for your particular application is as important as picking the right type and size of engine; a poor selection could result in a disastrous crash—or worse.

We've compiled this Guide to help make servo selection less complicated. Here, you'll find specs and data on offerings from each manufacturer so you can compare features at a glance. Got a space problem? We've listed the case sizes for you. How much torque is needed to control the ailerons on your new AT-6 Texan? Read the Guide to find out.

Servo applications

When it come to servos, how much torque and speed is enough? Well, that depends on your particular application and the performance level desired. There are, however, some basic guidelines for servo selection. Use the following rules of thumb when you make your decision:

• Midsize trainers. For all control surfaces, pick a medium-size servo that produces a minimum of 35 oz.-in. of torque. Speed is less important here, although a slower servo will make the plane easier to control for novice pilots.

• Sport aerobatic and ¼-scale. These aircraft require servos with more torque. For a 60-size sport plane, such as a Sukhoi, choose a servo with at least 50 oz.-in. of torque. Quarter-scale (120-size) planes require servos that produce at least 50 to 60 oz.-in. These planes are usually flown by more experienced pilots who demand quicker response. Fast servos are desirable for this type of plane.

• Giant-scale. Larger planes need servos that produce a minimum of 80 oz.-in. of torque. You can split the load by installing one 40 oz.-in. servo to control each elevator half of each aileron.

• Throttle control. A servo that's very resistant to vibration is desirable. Engine vibration can be transferred to the throttle servo through the throttle-control linkage. Talk to modelers, and they'll tell you that throttle servos are almost always the first to go!

New HIGH-FREQUENCY SERVO Technology

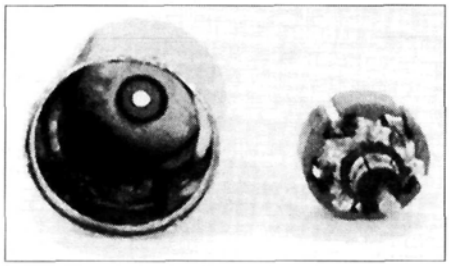
Did you know that, in most cases, a servo's maximum torque isn't reached until the servo has moved significantly away from center position? In fact, maximum torque may not be reached until the servo has travelled as much as 24 degrees away from center. Because of this, feedback from the plane's control surfaces, e.g., flaps, ailerons, rudder and elevator, can cause the servo's position to be deflected from where you want it to be.

Enter high-frequency servo technology. Normally, the servo's amplifier cycles power to the electric motor about 60 times per second, but with high frequency, this speeds up to about 2,200 times per second. The result is a significant increase in torque from center. In fact, maximum torque may be reached in as little as 1 degree from center. Control becomes more precise, and control- surface "flutter" as a result of servo feedback is virtually eliminated. Unfortunately, high-frequency servos drain batteries more quickly than standard servos, but for many, the results are well worth it.

As of this writing, only JR Remote Control* offers high-frequency servos (models NES-4000 and NES-7000), although I suspect that other manufacturers will be addressing the need for increased torque from center position. Whether or not they resort to high-frequency technology has yet to be seen.

What is a coreless motor?

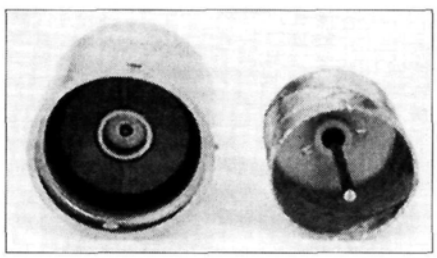
Servos use two common types of electric motors: cored and coreless. Of the two, the cored servo motor is the more conventional design. It features a central rotating armature. An armature, in this case, consists of steel plates "stacked" around the motor shaft. Conductive wire (copper) is wrapped around the segments (poles) of the stack. When current is applied to the wire, an electromagnetic field is generated, and it either repels or attracts (depending on the flow of electricity through the wire) the field of the permanent magnets of the surrounding motor can, causing the armature to spin.



Conventional 5-pole ferrite motor.

A coreless motor is like an "inside-out" cored motor in that the armature actually surrounds the permanent magnets. The conductive windings of the coreless motor are formed into the shape of a hollow tube—no stacked plates. Resin is applied to maintain the shape of the windings, which are bonded to a circular plate that holds the center shaft. The hollow armature is placed between the permanent magnets and the motor can. Similar to the cored motor, voltage applied to the windings causes an interaction between the electromagnetic field and the permanent field.

By design, a coreless motor will have more torque and accelerate more quickly than a cored motor. Because of its larger diameter, the cored motor's armature wields a larger "lever" on the motor shaft for increased torque compared with that of a similar cored motor. Quicker acceleration comes from the lower rotating mass of the coreless motor's armature—less to get moving! Less weight also means that the coreless motor will stop quicker for better servo response and less "overshoot."



Coreless motor.

In general, coreless motors produce more torque in proximity to the desired position of the servo. This allows better position "hold" and an increased ability for the servo to center. The downside to servos with coreless motors is that they tend to be more expensive than cored servos. Although early coreless servos were more prone to damage caused by vibrations than cored servos (the windings would sometimes fall apart because of heavy shocks or sustained vibration), newer materials and manufacturing techniques make coreless servos much more reliable.

PHOTOS COURTESY OF HORIZON HOBBY DIST.

Metal vs. molded gears

For increased strength, many servos use metal gears instead of plastic. Unfortunately, the price of durability is added weight. Metal gears are stronger than plastic, but metal-to-metal fri tion can actually cause the gears to wear mo quickly. As a result, metal-gear servos are mo

MODEL AIRPLANE NEWS SER

Mfr./Model	Dimensions LxWxH	Weight oz.	Torque/Transit speed oz.-in. / sec.-60°	Motor	Bearings	Application(s)	Pri
Ace R/C							
Micro 380	1.125x0.55x1.1	0.60	30/0.15	3-pole fer.	N/A	—	$3
Mini 310	1.25x0.55x1.2	0.95	28/0.33	3-pole fer.	N/A	—	$2
Sport 330	1.43x0.79x1.6	1.55	42/0.36	3-pole fer.	N/A	—	$1
Pro 342	1.43x0.79x1.6	1.55	42/0.36	3-pole fer.	Metal b.	—	$2
Pro 342HS	1.43x0.79x1.6	1.55	32/0.15	3-pole fer.	Metal b.	—	$2
Giant 370	1.97x1.14x2.3	3.5	130/0.34	3-pole fer.	Dual	—	$3
Airtronics							
94102 Precision, HD std.	1.54x0.79x1.42	1.59/50	0.22	3-pole fer.	N/A	—	$3
94141 Precision h-t	1.42x0.6x1.29	1.17	45/0.2	Coreless	Single	Sailplanes	$7
94161 Pro l-s	1.54x0.79x1.65	2.5	135/0.25	3-pole fer.	Dual	Quickie 500, electric airp. ¼-scale and giant-scale airpl.	$10
94322 Precision h-d	1.54x0.79x1.42	1.6	50/0.2	3-pole fer.	Single	—	$4
94407 Micro	1.23x0.6x1.23	0.96	29/0.23	5-pole fer.	Single	—	$6
94501 Microlite	1.07x0.5x1.07	0.57	29/0.23	Coreless	N/A	1/2As , sailplanes, small electrics	$7
94732 Contest airp.	1.54x0.79x1.38	1.8	68/0.19	Coreless	Dual	Pattern planes, ¼-scale planes	$8
94734 Contest retract	1.54x0.79x1.39	1.73	74/0.4	5-pole fer.	Dual	Retracts	$7
94735 Contest heli	1.54x0.79x1.38	1.8	75/.2	Coreless	Dual	Helicopters	$8
94738 High-torque	1.54x0.79x1.38	1.95	71/0.21	Coreless	Dual	—	$9
94739 Contest propo	1.54x0.79x1.38	1.77	74/0.42	5-pole fer.	Dual	Retracts, flaps	$9
94741 Contest	1.54x0.79x1.38	1.8	57/0.21	3-pole fer.	Dual	Fixed-wing aircraft	$5
94831 Mini	1.46x0.71x1.18	1.1	38/0.21	3-pole fer.	Single	Small models, sailplanes	$4
Futaba							
S133 Micro precision	0.5x1.06x1.12	0.6	27.8/0.22	5-pole fer.	N/A	Sailplanes, airp.	$6
S134G 1/4-scale retract	1.14x2.32x1.97	2.8	173.8/0.33	5-pole fer.	N/A	Retracts	$7
S136G Compact retact	0.87x1.75x1	1.48	76.4/0.5	5-pole fer.	N/A	Retracts	$7
S148 Precision	0.77x1.59x1.41	1.5	42/0.22	3-pole fer.	N/A	Sailplanes, airp., helis	$3
S3001 Precision b-b	0.77x1.59x1.41	1.6	42/0.22 f.	3-pole fer.	Dual	Sailplanes, airplanes, helis	$4
S3002 Metal gears/b-b	0.62x1.21x1.18	1.8	44/0.16	5-pole fer.	Dual	Sailplanes, airplanes	$9
S3302 Metal gear, 1/4-scale	1.14x2.32x1.97	3.6	110/0.19	5-pole fer.	N/A	—	$9
S3801 Arm-type sail servo	1.14x2.32x1.97	3.8	200/0.22	5-pole fer.	N/A	—	$9
S5101 Dual b-b	0.77x1.52x1.36	1.4	55.6/0.24	5-pole fer.	Dual	Helicopters	$6
S5102 Metal gear micro precision	0.5x1.06x1.12	0.8	27.8/0.22	5-pole fer.	N/A	Sailplanes, airplanes	$9
S9101 Coreless b-b	0.77x1.52x1.36	1.5	41.7/0.17	Coreless	Dual	Sailplanes, airplanes, helis	$9
S9102 Wing mount	0.87x1.85x1.05	1.6	50/0.13	Coreless	Dual	—	$12
S9202	0.79x1.59x1.4	1.7	69.5/0.22	Coreless	Dual	Airplanes, helis	$9
S9303 Metal gear	0.79x1.59x1.55	2.3	99/0.19	Coreless	Dual	Airplanes, helis	$11
S9304	0.79x1.59x1.4	1.7	69.5/0.22	Coreless	Dual	Airplanes, helis	$9
S9403	0.79x1.59x1.4	1.7	44.5/0.16	Coreless	Dual	Airplanes, helis	$9
S9601 Mini, metal gear	0.62x1.21x1.18	1.1	36.1/0.17	Coreless	Single	Sailplanes, airp.	$9
Hitec							
HS-80	1.1x0.5x1.1	0.62	31/0.15	3-pole fer.	N/A	Sailplanes, small electrics	$4
HS-80MG	1.1x0.5x1.1	0.76	31/0.15	3-pole fer.	N/A	Sailplanes, small electrics	$5
HS-101	1.3x0.5x1.2	0.93	24/0.2	3-pole fer.	N/A	Hand-launch gliders, small electrics	$3
HS-205BB	1.3x0.6x1.3	1.1	44/0.2	3-pole fer.	Single	Aileron, flaps, sailplanes	$3
HS-205MG	1.3x0.6x1.3	1.3	44/0.2	3-pole fer.	Single	Ailerons, flaps, sailplanes	$6
HS-300	1.6x0.8x1.4	1.57	42/0.19	3-pole fer.	Single n.b.	Basic servo	$1
HS-422	1.6x0.8x1.4	1.65	43/0.2	3-pole fer.	Dual Oilite b.	H-d standard servo	$1
HS-425BB	1.6x0.8x1.4	1.65	43/0.2	3-pole fer.	Dual	H-d- standard servo	$2
HS-605BB	1.6x0.8x1.5	1.73	77/0.16	3-pole fer.	Dual	Pattern and racing airp.	$5
HS-605MG	1.6x0.8x1.5	2.12	77/0.16	3-pole fer.	Dual	Pattern and racing airp.	$6

prone to backlash. In addition, metal gears can, in some cases, cause RF "noise" that interferes with your radio signal.

Some manufacturers are addressing the shortcomings of metal-gear servos by increasing the contact area of molded gears, using a combination of plastic and metal gears, or using a different type of metal (aluminum, for example) from the brass that's commonly used. As for making a choice, metal gears are still the strongest available, but plastic gears can offer greater longevity and tighter operation.

GUIDE

Mfr./Model	Dimensions LxWxH	Weight oz.	Torque/Transit speed oz.-in. / sec.-60°	Motor	Bearings	Application(s)	Price
litec							
S-615MG	1.6x0.8x1.5	2.12	107/0.21	3-pole fer.	Dual	Large rudders, "barn door" flaps	$69.95
S-700BB	2.3x1.1x2	3.6	133/0.22	3-pole fer.	Single	G-scale elevators and rudders	$39.95
S-705MG	2.3x1.1x2	4	161/0.27	3-pole fer.	Single	G-scale elevators and rudders	$64.95
S-75BB	1.7x0.9x1	1.3	90/0.5	3-pole fer.	Single	Retracts	$64.95
lobbico Command							
S-51 Standard	1.6x0.8x1.4	1.75	42/0.19	3-pole fer.	N/A	—	$17.99
S-55 Deluxe	1.6x0.8x1.4	1.61	43/0.20	3-pole fer.	Metal b.	All airp. and helis	$19.99
S-57 Deluxe	1.6x0.8x1.4	1.6	40/0.23	3-pole fer.	Dual	—	$25.99
S-31 Mini	1.3x0.5x1.2	0.93	24/0.20	3-pole fer.	N/A		$34.99
S-72 1/4-scale	2.3x1.1x2	3.6	133/0.22	3-pole fer.	Dual	All ¼ -scale aircraft	$47.99
S-11 Micro	1.1x0.5x1.1	0.61	30/0.15	3-pole fer.	N/A	Electric airp. and sailplanes	$49.99
S-67 Deluxe	1.6x0.8x1.4	1.61	43/0.2	3-pole fer.	Dual	All airp. and helis	$59.99
S-63 Low -profile	1.7x0.9x1	1.23	92/0.5	3-pole fer.	Dual	Retractable landing gear	$29.99
oyal							
axi	2.25x2.31x1.13	3.7	112/0.22	3-pole fer.	Single	—	$32.95
andard	1.88x1.63x0.75	1.8	48.7/0.24	3-pole fer.	N/A	—	$15.99
iorty	0.69x1.63x0.75	1.4	44/0.23	3-pole fer.	N/A	—	$18.95
ini	1.44x1.44x0.69	1.1	33.5/0.16	3-pole fer.	N/A	—	$24.95
icro	1.5x1.22x0.63	0.9	27/0.14	3-pole fer.	N/A	—	$32.95
R Remote Control							
11 Micro	0.50x1.12x1.17	0.63	31.9/0.24	5-pole fer.	N/A	Sm. airp., gliders, elec. heli, throttle, air retract, mixture	$59.95
1 Mini (cored)	0.58x1.30x1.02	0.77	29.2/0.23	5-pole fer.	Single	Sm. airp., gliders, elec. heli, throttle, air retract	$59.95
21 Mini (coreless)	0.58x1.30x1.02	0.84	37.5/0.22	Coreless	Dual	Sm.-med. airp., elec. heli, throttle, air retract, gliders, mixture, pylon airp.	$79.95
1 Mid-Size	0.71x1.37x1.32	1.33	43.1/0.27	5-pole fer.	Dual	Pylon racers, sport airp., .30 helis, aileron, gliders	$59.95
21 Mid-Size	0.71x1.37x1.32	1.5	57.5/0.22	Coreless	Dual	High-perf. sport, .30 helis, aileron, jets	$79.95
7 Standard	0.73x1.52x1.32	1.47	40.3/0.25	3-pole fer.	N/A	Sport/trainer	$29.95
7 Standard	0.73x1.52x1.32	1.58	40.3/0.25	3-pole fer.	Single	Sport aircraft, .30 helis	$39.95
31 Ultra precision	0.73x1.52x1.32	1.5	90.4/0.23	Coreless	Dual	Comp. airp. pattern, high-perf. sport, .60 heli	$89.95
21 Ultra torque	0.73x1.52x1.32	1.72	119.6/0.22	Coreless	Dual	60-2.5 size airp., pattern rudders, helis	$99.95
3 Low-profile	0.88x1.73x0.93	1.16	93.2/1.36 (160°)	Cored	Dual	Aerobatic/scale, mechanical retracts	$79.95
05 Low-profile	0.88x1.73x0.93	1.31	62.6/0.19	Coreless	Dual	Sport/competition aerobatic aileron	$109.95
5 Monster FET	1.26x2.5x2.3	4.75	139.1/ 0.28	Cored	Dual	Monster 1/4-scale airp., helis	$109.95
21 Glider wing	0.58x1.3x1.3	0.95	59.8/ 0.36	Coreless	Dual	Aileron servo for high-perf. sailplanes	$89.95
S-4000 h-f	0.73x1.52x1.32	1.83	73.7*/0.17	Coreless	Dual	Comp. airp. control surfaces & helis	$139.95
S-7000 h-f	0.88x1.73x1.02	1.48	60.8*/0.16	Coreless	Dual	Comp. airp. control surfaces & helis	$139.95
ower System 2000							
-51 Standard	1.6x0.8x1.4	1.75	42/0.19	3-pole fer.	N/A	—	$14.99
-55 Deluxe	1.6x0.8x1.4	1.61	43/0.2	3-pole fer.	Metal b.	All airp. & helis	$16.99
-57 Deluxe	1.6x0.8x1.4	1.6	40/0.23	3-pole fer.	Dual	—	$21.99
-31 Mini	1.3x0.5x1.2	0.93	24/0.2	3-pole fer.	—	Electric airplane or heli	$29.99
-72 1/4-scale	2.3x1.1x2	3.6	133/0.22	3-pole fer.	Dual	All 1/4-scale aircraft	$40.99
-11 Micro	1.1x0.5x1.1	0.61	30/0.15	3-pole fer.	N/A	Electric airp. and sailplanes	$28.99
-67 Deluxe	1.6x0.8x1.4	1.61	43/0.2	3-pole fer.	Dual	All airplanes and helis	$24.99
-63 Low-profile	1.7x0.9x1	1.23	92/0.5	3-pole fer.	Dual	Retractable landing gear	$44.99

gend: airp.—airplane(s); b.—bushings; b-b—ball bearings; comp.—competition; h-f—high-frequency; fer.—ferrite; G—giant; h-d—heavy duty; h-t—high-torque; l-s—large-scale; n.b.—nylon bushings; ɔpo—proportional; sm.—small.

Ace R/C servos are available with Deans connectors at an additional cost of $1.

What's red, white and a flying delight? The McCessa! Ernie Hayworth of Horseheads, NY, combined the looks of a Senior Cadet and Cessna. Ernie thinks he needs more power than the Astro 40 geared motor on 18 cells provides. I disagree; I was fascinated by its slow, rock-stable passes (despite the wind). Ernie will have plans available soon.

Two photos: above & below Steven Stratt took first place in Best Scale Aircraft for the third year running. His impressively detailed, 66-inch-span Focke-Wulf FW-56 was powered by an Astro Flight FAI 15 running on 12 cells and turning a 10x8 Master Airscrew prop.

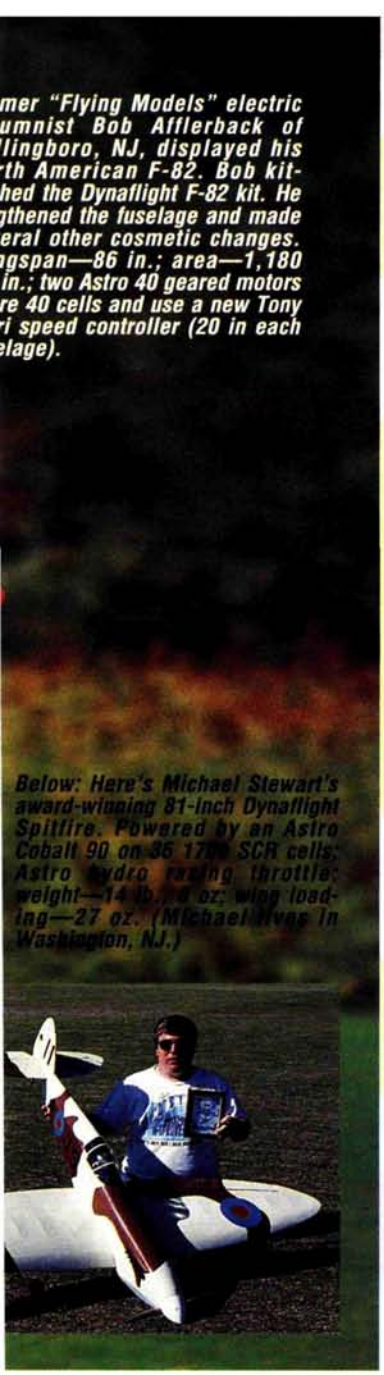
Above: the Fantasm is a scratch-built ducted fan built by Ed Berchtold of Lambertville NJ. Morley fan unit with Astro FAI 15 motor on 11 cells; Flightec speed controller; wing area—300 sq. in.; weight—36 oz.; needs a little fine-tuning, but should be a fine flier.

Above: Jerry Smartt (Wa showed us his new design powered aircraft fuse buffer battery; only sola The uniquely shaped fo and 14:1 geared motor w made in Germany. The r combination will deliver a miserly 2A draw. A weight, ready to fly—20 t

Above: Master modeler Keith Shaw demonstrates the helpful spirit that has been a hallmark of all the KRC fly-ins. He has just test flown a fellow modeler's Spitfire.

Right: Keith Shaw's new Goon—a 1/3-scale model of Art Chester's 1939 winning pylon racer. Wingspan—69 in.; area—1,050 sq. in.; weight—14 lb.; Astro 90 turns an APC 16x12 at 7,200rpm on 36 Sanyo 1400mAh SCR cells. Spring Air retracts top off this beauty.

mer "Flying Models" electric umnist Bob Afflerback of llingboro, NJ, displayed his th American F-82. Bob kit-hed the Dynaflight F-82 kit. He gthened the fuselage and made eral other cosmetic changes. ngspan—86 in.; area—1,180 in.; two Astro 40 geared motors re 40 cells and use a new Tony ri speed controller (20 in each elage).



Below: Here's Michael Stewart's award-winning 81-inch Dynaflight Spitfire. Powered by an Astro Cobalt 90 on 36 1700 SCR cells; Astro hydro razing throttle; weight—14 lb., 4 oz; wing loading—27 oz. (Michael lives in Washington, NJ.)

by BILL GRIGGS

KRC Electric soars to new heights

ELECTRIC · FLY

EVERY SEPTEMBER, *electric modelers from around the world enter a unique competition to see who can go the fastest, stay up the longest, soar the highest, be the most dazzling, or shock people the most. It's a contest no one ever really wins, because the finish line keeps moving, records are constantly broken, and new surprises keep coming.*

The Keystone Radio Control (KRC) club has sponsored this great event—the KRC Electric Fun Fly—for the past 15 years, and this was my 11th, so I kind of knew my way around the place.

Tom Hunt shows off a modified Midwest Jetster built as a test bed for a new electric ducted fan now offered by Kress Jets.

Let's go walk the flight line together. It's 7:30 a.m.; many people are here already, and the flight line is nearly full. I think back to the first time I attended the KRC electric meet in 1983. Electric models were simpler then and not quite as dependable. The first electric I saw that could take off from the ground and taxi belonged to Dwight Holley.

Eleven years later, there are ducted-fan electric models that can take off from grass—something that glow-powered ducted fans still don't routinely do.

Ted Davey displayed two of the latest additions to his kit line. The low-wing Viper was designed for 40-size gas or glow propulsion. The glider—the Slick—is made for 05- to 15-size systems.

The Electric Jet Set

Electric ducted-fan models have appeared sporadically at the KRC event for the past seven years. Bob Rumsey flew the first fan model at KRC in 1987. There must be at least a dozen here this year. Most of the planes use a bungee launch or a hand-launch.

Keith Shaw brought his flight-proven Horten IX flying wing—a German fighter that displays blistering speed and stunning aerobatic capability.

Above: Tom Hunt built this modified Midwest Jetster as a test bed for a new electric ducted fan that Kress Jets is developing. The 89mm-diameter fan is based on a rotor designed in England by Kurt Grosse of Electro Jet Technology. The rotor is spun by a wet-magnet car motor and develops roughly 28 oz. of thrust. Kress developed the fan with vacuum-formed parts to make it easier to assemble. The Jetster flew with great authority and did aerobatics.

Thomas Hook liked the performance of Keith's Horten so much that he designed his own. He first designed a plywood shroud and 2⅝-inch-diameter impeller, and then he designed a test-bed aircraft for his system. When he had everything sorted out, he began to work on the Horten.

Quick! Turn around, or you'll miss Earl Brightbill's Electric Viper—the only ducted fan to take off from the ground at KRC. Earl cut down a 7x6 Grish Tornado 3-blade prop to a diameter of 5 inches and powers his Viper with an Astro 15.

Let me show you my Das Vonder Jet. It's a modified Sig Wonder with twin ducted fans. I stretched the wing to 50 inches and the fuselage by 6 inches. I mounted two Mitchell* EJET units on the tail, and they share a single Astro 15 motor.

Here comes Don Belfort with his tiny Electro Screamer—designed to use the Hiline* RedFlame Blaster fan unit with seven 400mAh SCR cells. The Screamer weighs only 16.25 ounces. Watch him loop and roll it from level flight; speed seems to be about 40mph (not a lot of money invested, but a lot of fun).

There are several other fan models, including two Kress VI Buzz Bombs and the Fantasm flying wing. But let's go see the most impressive fan of all—the Jetster.

Thomas Hook (Homesdale, PA) designed this homemade ducted-fan unit. The plywood-blade impeller is 2⅝ in. in diameter and produces 1.5 lb. of static thrust. The three-blade impeller is spun by an Astro ducted-fan motor on nine 100mAh cells. The model (not shown) has a 47.5-inch wingspan; bungee launch; flight times—about 2 minutes.

Don Belfort (Cincinnati, OH): Electro Screamer ducted fan; wingspan—34 in.; wing area—205 sq. in.; Hiline RedFlame Blaster, 2.5 in. ducted-fan unit; six or seven 400mAh SCR cells; flying weight—16.25 oz. (six cells), 17 oz. (seven cells); flight times—2 to 3 minutes at 10 to 13 amps. Control functions include throttle, elevator and aileron.

Tom Hunt modified a Midwest Jetster kit to accept an Electro Jet Technology/Kress Jets fan. Kurt Grosse of England designed the fan rotor unit, and Bob Kress modified the shroud to make it more marketable. Bob reduced the parts count and made the unit easier to assemble by using vacuum-formed parts.

Tom says he shortened the Jetster wing and installed 14, 1100mAh cells. With an 18-ounce wing loading, this plane can really move. Just imagine what these units could do in a Kress A-10 Warthog! The Electro Jet should be available by now, so get in line—*behind me!*

WINNERS

■ SATURDAY

Smallest Aircraft—fuselage and span
1 Andy Clancy—The Goblin (30 inches total)

Best Scale Aircraft
1 Bill Wargo—Antoinette
2 Ken Stinson—C-130
3 Dave Grife—Mosquito

Best Sailplane
1 James Collins—Spirit
2 Howard Chevalier—Amp Eater
3 Abe Schwartz—Argus Pro

All Up, Last Down
1 Jerry Smartt
2 Doug Holland
3 John Mountjoy
4 Clyde Geist

Best Multi-Motor
1 Keith Shaw—deHavilland Comet
2 Dave Grife—deHavilland Mosquito
3 Don Bousquet—Catalina PBY

CD's Choice
1 Keith Shaw—Stearman
2 Mike Stewart—Spitfire
3 Earl Brightbill—Mariah (fan jet)

Most Impressive Flight
1 Keith Shaw—Horten flying wing

Best Technical Effort
1 Don Bousquet—Spirit of Narragansett (video plane)
2 Tony Fiori—P-51 Mustang
3 Joe Utasi—Ligetti Stratos

■ SUNDAY

Largest Aircraft—fuselage and span
1 Art Thoms—Custom Privateer (206.5 inches total)

Best Scale Aircraft
1 Steve Stratt—Focke Wulf FW-56
2 Keith Shaw—The Goon
3 Dave Grife—Hawker Hurricane

Best Fan Aircraft
1 Earl Brightbill—Electric Viper
2 Thomas Hook—Original design
3 Don Belfort—Electro Screamer

Best Old-Timer Aircraft
1 Colin McKinley—Snow White
2 Jerry Smartt—Brooklyn Dodger
3 Herb Greenberg—Red Zephyr

Best Sailplane
1 Mike Popescu—Esteem
2 Bob Pizio—Electra
3 Sam Stitzer—Vengence

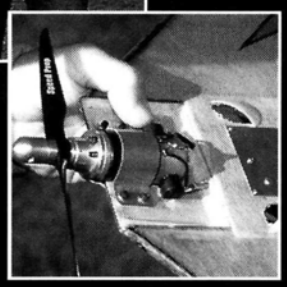
CD's Choice
1 Don Belford—Piper J-3
2 Brad Baylor—Vortex
3 Clay Howe—Modified Sig Kadet Senior

Most Impressive Flight
1 Dave Grife—Electro Streak

Best Junior Modelers
1 Nate Bousquet (13)
2 Justin Prabanic (15)
3 Adam Cogan (14)
4 Melissa Stewart (6)

Sport Planes

Russ Pribanic's Diamond Dust delta wing blew the doors off the house! Blistering 101mph speed (radar verified); a fast roll rate; incredibly slow landing speed; a laser-cut kit with only four wing ribs; direct-drive, five-turn Astro FAI 05 motor; 7x7 prop; Jomar SM4 speed control; 8 1400 SR Max cells; flying weight—almost 3 lb. The aluminum housing at the end of the motor is a prop-shaft protector that Russ designed.



Ohhh! Gene Norman is bringing a beautiful low-wing plane back to the pits. It's his Humming Bird Mk. III, and it has a striking color scheme done in MonoKote Pearl Wine and Red. This is one of the best-looking planes I've seen so far.

Farther along, Charles Evans is just getting ready to put his yellow biplane—Der Jeager—through its paces. Pulled by a 40 cobalt, it's very aerobatic.

The hot whine of its 05 drawing about 40 amps catches my attention as a Delta Dust streaks by. Russ Pribanic's FAI 05-powered delta wing has been clocked at 101mph on radar. If you don't believe me, ask Don Bousquet, who captured it on video tape from the air. Don, his son Nathan, and several friends built the Spirit of Narragansett video plane. This twin-boom, droop-snout plane carries a Canon video camera in its nose and produces some fascinating shots.

That's Joe Utasi finishing a flight with his Ligetti Stratos, and Don Belfort and Tom Hunt are launching their Speed 400 pylon racers. Tom is flying his fiberglass-and-foam SPF 400 racer against Don's built-up Rocket. I won't brag too much about this close race because I designed the Rocket. Don can do the bragging for both of us.

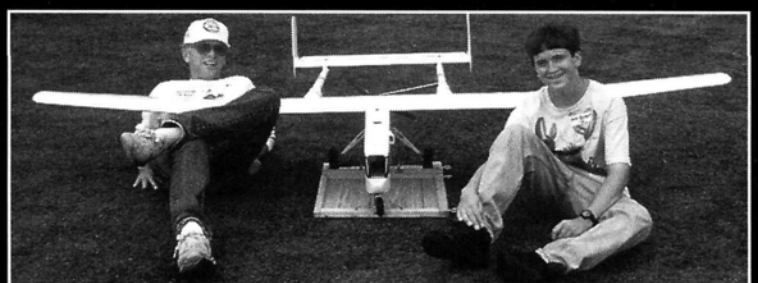
Why don't we check out the vendors while everyone else is watching the All-Up Last-Down event? Don't worry if you miss something; you can watch it on the video tape that KRC* is producing ($23, including S&H). You did bring your plastic didn't you?

Charles Evans of Clarcona, CA, flew a neat der Jeager biplane in the blustery winds on Sunday; Astro Cobalt 40 geared with 13x6.10 prop on 20 cells; Flightec speed controller; machine guns made out of hair curlers.

The Humming Bird Mk. III by Gene Norman of Atlanta, GA, had one of the prettiest covering jobs—a MonoKote Pearl Wine and Pearl Red scheme that really accentuates the plane's smooth lines. An Astro FAI 40 on 16 cells moves this 93-oz., 605-sq.-in. plane; an APC 10x5 prop draws 40 amps.

Abe Schwartz came all the way from San Juan, Puerto Rico, to fly his Robbe Arcus Pro. The wing is covered with translucent Pearl White MonoKote with Pearl Red wingtips; Ultra 900 motor; 10 cells; 9x5 prop; has flown up to 700 feet.

Beautiful paint job!—Ralph Weaver's fast, smooth and agile Surprise 2 sailplane; Astro Cobalt FAI 25 competition motor (model 628); 10 cells; Freudenthaler 9.5x6 prop; Steve Neu FAI controller; JR PCM 10 radio.



Don and Nathan Bousquet—two sky spies from Narragansett, RI—have been experimenting with aerial videos for two years. The stable (but funny-looking) Mark 2 video plane was designed and built by Don and several friends. The camera is pointed to shoot out through the nose; geared Astro Cobalt 40; 14x8.5 Fruedenthaller prop; Graupner 45 MOS speed control; 21, 1700mAh SCRC cells; Airtronics Infinity radio. Despite the weight of the camera, this plane really knows how to loaf in the air!

'Twas The Night Before...

Thursday; the night before KRC. At about 10:30, I decide to head for bed. I figure I'll set the alarm clock for 4 a.m., pack the car and be on my way bright and early.

Around 7:30 a.m., my wife wakes me and asks why I didn't set the alarm! By 9 o'clock, we're on our way. By the time we pull into the Best Western parking lot, we've missed half of the SR Batteries symposium. If the first half of the symposium was *half* as good as the second half....

SR Batteries Electric Flight Symposium

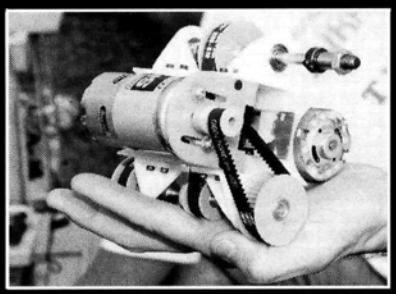
Eleven hobby notables gave talks on a variety of topics from running a kit manufacturing business to advanced composite construction techniques. To me, Steve Anthony's talk on finishing obechi was alone worth the cost of admission. Larry Sribnic should be commended for putting together a really fine show. Each speaker had 25 minutes to talk.

- *David Baron* discussed the state of electric technology;
- *Bob Kress* talked about propeller selection and motor matching;
- *Bob Hunt* explained a unique, lost, foam construction technique;
- *Ted Davey* told of the trials and tribulations of the R/C kit manufacturer;
- *John Mountjoy* compared electronic speed controls;
- *Bob Kopski* gave a fascinating explanation of in-flight telemetry;
- *Keith Shaw* talked about designing scale electric planes;
- *Bob Aberle* explained the Society of Antique Modelers' electric class;
- *Steve Anthony* taught us how to finish obechi-sheeted wings with varathane;
- *Clyde Geist* showed us a variety of micro-size electric planes and motor systems;
- *Larry Sribnic* discussed battery care and maintenance;
- *Steve Anthony* and *Bob Kopski* gave us some of their secrets to flying electric aircraft at night.

I'm really sorry that I missed the first half of this seminar. All is not lost, however; a video tape of symposium highlights will be available from SR Batteries* at about the time you read this. Save me a copy, Larry.

Noted French modeling journalist Guy Revel (left) holds author Bill Griggs' Speed 400 Rocket pylon-racer design, and Bill shows off his Das Vonder Jet twin ducted fan (adapted from a Sig Wonder kit). Guy covers the KRC meet (and myriad other modeling topics) for a variety of magazines worldwide. He noted the unique diversity of sport and scale aircraft at KRC.

Peddlers' Row



Bob Kress showed us his new four-motor belt-drive system. This super-high-torque system connects four Speed 700 motors to a common drive shaft and can be used to fly hefty, 1/4-scale planes.

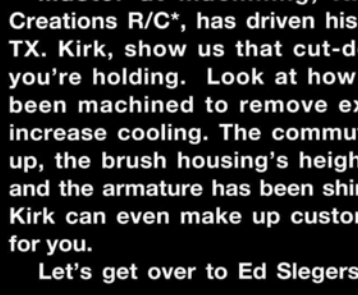
KRC is the best place to buy electric supplies; all the little companies are here. There's Charles Sylvia of CS Flight System*, who has been coming here for more than 10 years and puts out one of the most comprehensive catalogues in the industry.

Next to Charles is Elliott Boulous and the Institute of Silent Flight's* trailer—always filled with electric goodies. It's a full-service hobby shop dedicated to electric and soaring aircraft, and it's the only place I know that stocks all the replacement parts for the Kalt Whisper and Kyosho EP Concept electric helicopters. Bob Boucher of Astro Flight* brought his new, Model 211 digital speed controller and his new five-turn 40 and 25 (10-cell) FAI racing motors. Bob is the grandfather of electric flight and, true to form, he offered the latest in power-system technology.

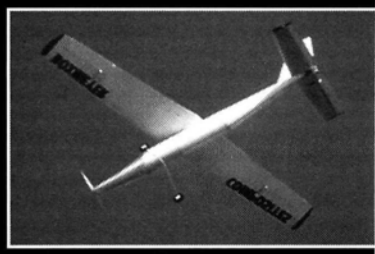
Cermark Electronics* made the trip from Illinois. They seem to have some of everything—battery packs, servo extensions, propellers, chargers. Hey, look!—an ARC Playboy Sr. cabin model for less than $100!

Master at machining, Kirk Massey of New Creations R/C*, has driven his trailer in from Willis, TX. Kirk, show us that cut-down Astro 05 motor you're holding. Look at how the motor case has been machined to remove excess weight and to increase cooling. The commutator has been trued up, the brush housing's height has been reduced, and the armature has been shimmed to reduce play. Kirk can even make up custom armature windings for you.

Let's get over to Ed Slegers* before he sells out. Pick up that wing over there; light, isn't it? That's because it's a hollow molded wing for an Aura II.



Bob Boucher of Astro Flight displayed his new Model 211 digital speed control. It features digital signal processing and a built-in brake and will handle 65 to 70 amps and 25 volts.



You can use Boxmeyer Composites new Tufflite to build a stressed-skin structure of any shape, except a compound curve. Plane is loosely based on the NASA AMES AD1. The wing is capable of swinging back 90 degrees perpendicular to the fuselage and up to a 60-degree sweep. The wing pivots on 3/4-inch-diameter, aircraft-aluminum tube using a 1/4-scale servo. Wingspan— 86 in.; area—860 sq. in.; length—67 in.; weight—7.5 to 8 lb. Astro geared .40 motor; 21-cell 150 SR pack.

See that white plane? It's the new Electric Hawk 10-cell ship—a Mark Allen design. The fuselage comes painted, and the wings are already sheeted with obechi. I need one of these.

What do you mean you're out of money? We haven't even seen *half* of the vendors. There's still Model Electronics*, Ted Davey*, Sermos R/C Snap Connectors* and Aveox* (who marketed the first electric motors). We've just *got* to see Flightec* and Jomar*. What about Kress and Ztron? Clancy Aviation is here and so is Lansdale Hobby. We can't stop now! I know we forgot someone.

OK...OK...you win. We can always come back next year. I'll meet you right here. See you!

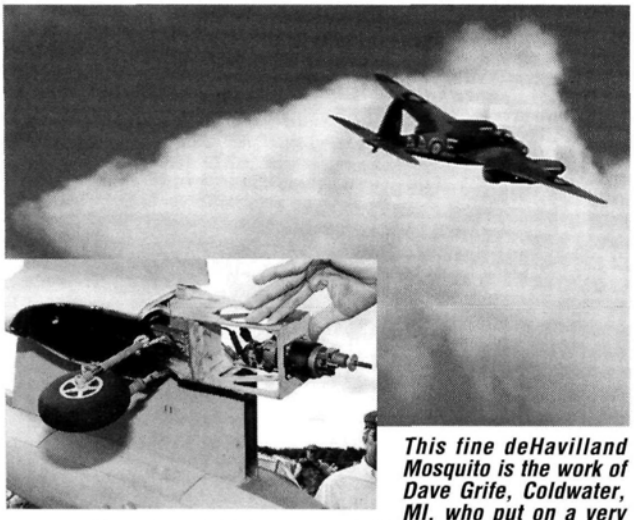
Two are more fun than one

Did you notice all those multi-motor planes? I just love the sound of twin propellers, and I'm convinced that electric motors are better for this application than glow engines are. Motors don't stall, lean out, or run rich.

Check out that big white plane climbing over the trees. Wow! It's a C130!—a foam C130 Hercules made by Ross Weaver from Indianapolis IN. Ross built it from drawings he got on Compuserve from a friend in Germany. It's made of white foam that was hot-wire-cut to shape. It's powered by four, 7.2V, Graupner Speed 400 motors, which are run on a single 10-cell pack. Look at that thing climb! If it weren't for the nacelles, you couldn't tell it from the real thing. Now, if I only had the time...!

Farther down the line, Ken Stinson has a much more accurate scale version of the Hercules that's powered by four, specially wound Pittman motors and really shows off his superb building skills. Ross's Hercules is slightly smaller but half the weight of Ken's.

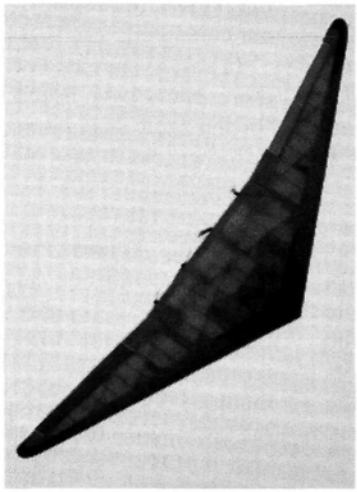
This C130 Hercules really performed well. Built by Ross Weaver from Indianapolis, IN, it's my favorite, multi-engine plane. While in Canada, Ross built it using drawings obtained on Compuserve from a friend in Germany. Painted in U.S. Coast Guard C130 colors, it has Canadian emblems because Ross couldn't find any U.S. flags. White foam (hot-wire-cut to shape); wingspan—80 in.; total weight—4 lb.; four 7.2V Graupner Speed 400 motors (all run off a 10-cell pack, each pulling 8 to 10 amps. The fuselage center section is a cylinder; the rear is a tapered cone. The nose was roughly carved to shape with a knife and then sanded smooth. Spruce spars strengthen critical areas.



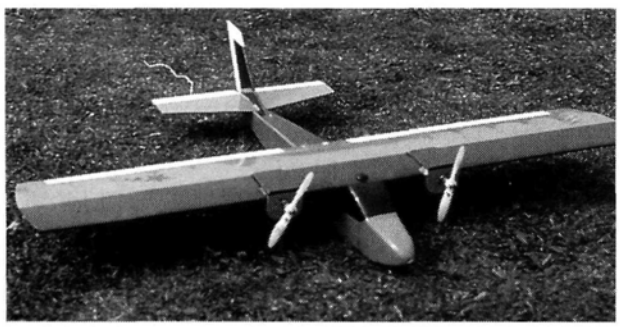
This fine deHavilland Mosquito is the work of Dave Grife, Coldwater, MI, who put on a very ramatic 5½-minute flight. Dave used Brian Taylor drawings from ob Holman plans. Wingspan—81 in. (IMMA-legal); wing area— 000 sq. in.; flying weight—14.5 lb.; wing loading—33 oz.; two stro geared 40s are powered by 36 1400 Sanyo cells; 14x8 Zinger rops draw 30 amps static; Astro 205 speed controller; Spring Air etracts and retractable tail wheel; color scheme is clear onoKote painted with Floquil paint.

Right next to the Keith Shaw pavilion, Dave Grife is working on his deHavilland Mosquito—one of the nicest-looking WW II planes. "Dave, show us the inside of the engine nacelle you're working on. Is that an Astro 40? Retracts, too?" The whirring of those twin fire-breathers sounds awesome.

That looks like a twin Leisure Wasp—two AP 29 motors mounted on a Wasp wing. Dave Dantonio is really smoking with this little blue twin. I think this is a good way to get into multi-motor planes without spending a ton. ■



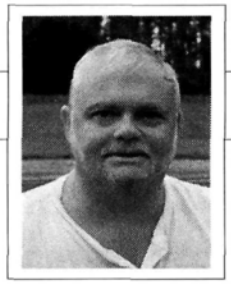
Keith Shaw's King Crimson—a pure flying wing—was based on the 1930's Horten (German) design. Wingspan—126 in.; area—2,000 sq. in.; weight—10.5 lb.; power—four Leisure 05s on 28 Sanyo SCR cells with Jomar SC-6 speed controller; 10x8 Rev-Up props; retracts. Note the internal structure, which is designed to resist twisting under load. This plane taxis out, takes off, carves up the sky for several minutes, lands and taxis back—like all Keith's models.



vid Dantonio's neat little blue twin was loosely based on the isure Wasp wing. Twin Kyosho AP 29 motors (both run in paral- off a single 6-cell pack; each draws 10 to 11 amps—22 amps al); weight—31 oz. Not a beginner's ship.

Ken Stinson scratch-built a C130 Hercules from a three-view published in the December 1981 issue of Model Airplane News. Wingspan—85 in.; area—839 sq. in.; wing loading—23 oz./sq. ft.; weight—8.5 lb.; batteries —20, 1400 SCR Sanyo; props— 9x6 Zingers cut down to 8x6 and notched to make four blades. Ken rewound four Pittman motors (not commercially available) and used 3:1 Master Airscrew gearboxes.

SPORTY SCALE



FRANK TIANO

GIANT-SCALE RACING AT ITS BEST!

NOT SINCE the very first time that we mentioned the Top Gun Invitational back in the winter of '88, have we received as much mail and phone calls about a particular subject highlighted here in *Model Airplane News*. We stopped logging the phone calls when they hit 300; it became almost impossible. The subject matter? Would you believe racing? It seems that the concept of "Penny Pinching Pylon" has really stirred some interest in the Midwest AT-6 Racing Association and the many races that will result because of it. I gave a general overview of the rules a couple of issues ago and casually mentioned that the organization was being set up by FTE* at that time and that a logo and set of rules would be forthcoming shortly. Owing to the incredible interest that many of you have shown, I put the project on the front burner, and I'm pleased to announce that the information is now available.

This is Wiley Brown (no relation to Charlie); he is president of Hi-G Promotions and one of the founders of the USRA. See Wiley's T-6 (a funny color of blue and gold stripes) and the cowl with an orange rudder? Great for color-blind people! Why are you smiling, Wiley?*

T-6 RACING ASSOCIATION

The T-6 Racing Association will supply a certified race number, a simple set of rules and a neat cap for all who join. T6RA will also log all points received by anyone who races at the many races each year and designate a national points winner at the end of the season. Naturally, it is up to the race promoter to forward all race results to the T6RA for input in our computer.

In cases where two or more pilots have asked for the same race number, we will try to accommodate all by adding a letter to the end of the number. For example, number 34 from San Diego may become number 34S; from Columbus, it might be 34C. The rules for the aircraft and the size of the course are the only things that the T6RA will get involved in. All other race rules will be handled by the host club along with its promoter.

As of right now, it looks as if there will be at least 30 club-sponsored Midwest T-6 races during 1995 with a major showcase of a limited number of entries at the popular Galveston Air Races in July. Remember, any club with Quickie 500 experience can surely host a race, and others can learn from them.

The course is triangular, and the maximum distance between pylons is only 1,200 feet. For more information on how to join the TGRA, see the ad and application form elsewhere in this issue.

SCALE RACERS UNITE

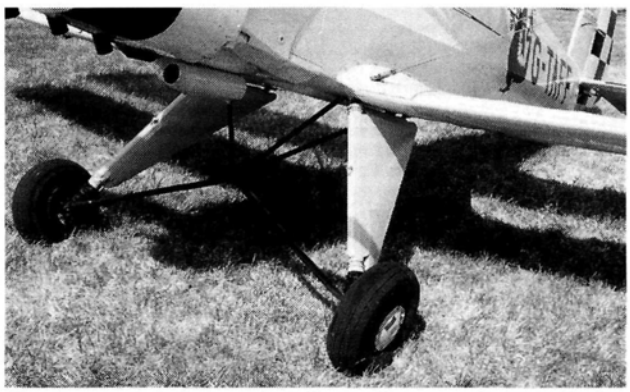
It has been a few years since the first giant-scale racers took the pylons at Madera, and a lot of stuff has happened since then. Ideas have gone back and forth concerning the best way to host what has become almost an entire week of racing. Rules have been changed, organizations started and canceled, and several different classes of racing have been initiated and then strapped with different engine requirements, depending on where the race was held. Well, I'm really excited to announce that a group of racers has come to the rescue with a fantastic menu for safe, happy and successful racing.

Just to show you how radical you can get with T-6 color schemes, number 045 has dark pink separated from bright yellow with a thick black stripe. The black tape on the canopy adds a really nice touch!

Who says that eyeball-scale airplanes are dull? Fred Manna did a fabulous job on this 81-inch Dynaflite Spitfire. He added wing fillets, gear doors and gun blisters for a great effect. covered it with Super Coverite and painted it with Chevron spray paint! The 15-pounder is powered by an O.S.* 1.08 and has 25 flights on it now.*

Jay Evans likes big biplanes, so the Balsa USA Stearman fit his needs like a glove. The 118-inch bipe is covered with 21st Century fabric from Coverite and painted with its paint as well. A Quadra* 100 (6 cubes) flies the 45-pound Stearman with ease.*

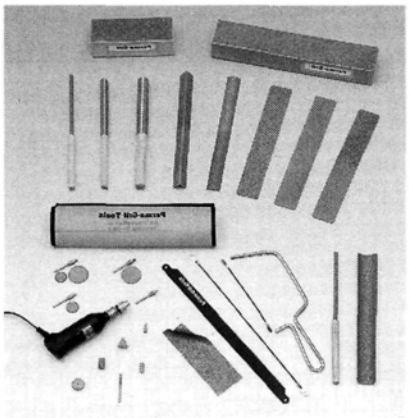
Bob Curry's Pica Jungmeister on a flyby at the Rhinebeck Jamboree. You might recognize his name as one of Top Gun's static judges. The Jungy is powered by an O.S. .90 and does every trick in the book.



Need a special photo of just the landing gear for your Bucker Jungman or some other project? Bob Holman has a series of wonderful stuff—real close-ups of various parts of many, many planes for as low as 85 cents per pic. What more could we ask for?

The Unlimited Scale Racing Association (USRA) has arrived. Its motto or slogan says it all: "Leadership and vision for the sport of giant-scale air racing." In a nutshell, this Houston-based group comprises several high-profile people who are active in both racing and manufacturing. They have formed a temporary panel to get things started, and every officer will be democratically elected just like in the AMA! USRA will help host, govern and promote all forms of large-scale racing. They will offer rules packages for all the current classes as well as the new Thompson class. They have graciously included our new Midwest class in their organization as well. Their goals are to establish safe racing with standardized rules and race operation guidelines. They will promote the professional sport of giant-scale racing and provide plenty of information and service to its members. This is the first such organization, to my knowledge, that has promised that its membership list will be available to any member. Time will tell.

USRA
Unlimited Scale Racing Association

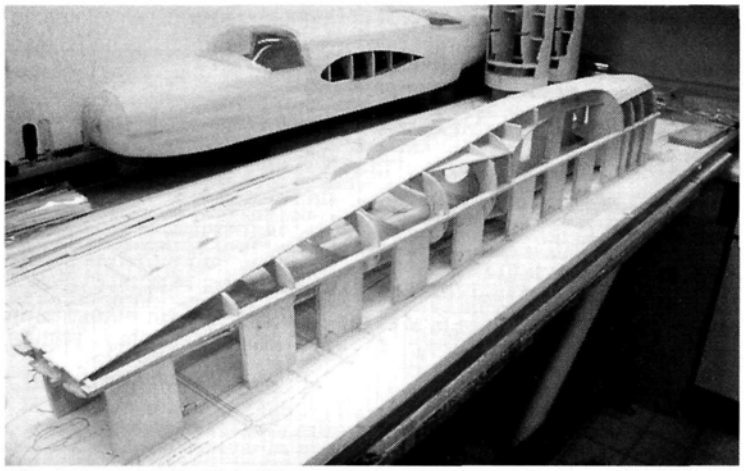


An example of when one picture is worth a couple hundred words. Here is the entire Perma Grit lineup of almost "unwearoutable" sanding tools. This is must-have stuff for the dedicated scale modeler!

But the part I like the best is that they're holding democratic elections, not only for officers, but also for the rule-making/changing process! Their membership application fee is a measly $25 and includes a card, hat, decal and a copy of the bylaws. This promises to be our future for giant-scale air racing, one that any member can join and proceed up through the ranks and get as deeply involved in scale racing as he or she wishes. Sounds great to me! *[Editor's note: for more information on giant-scale racing and how the USRA fits into the "big picture," see this month's editorial.]*

PLANS UPDATE

The latest information is always at your fingertips here in "Sporty Scale." For example, I've just seen the final production proofs by Don Smith Plans* of the new Tucano and B-29. The Tucano is true 1/5 size with an 86-inch wingspan, and the B-29 is 1/12 scale and still features an enormous 141-inch span and a 99-inch length! The Embraer Tucano is a two-seat Brazilian trainer with tricycle gear, and there is absolutely no problem finding three-views or color documentation on this one. The



Here's how Don Smith builds a warp-free fuselage. The Tucano's right side is pinned to the plans. That's an A-26 fuselage on the back bench.

plan price is $47 for five sheets, including a full model-size scale view for all panel lines and rivet locations. The fiberglass cowl costs $32, and the enormous canopy sells for $30. The B-29 Superfortress needs seven plan sheets to build and sells for $58. The epoxy cowls retail for $25 each, while the 10-piece canopy and turret package is only $50.

Bob Holman*, another well-known plans person, has now entered the photo-pack market with an exclusive line of documentation photos from the David Boddington Collection. Bob's approach to selling these photos is a novel one: you don't have to purchase an entire package. Nope. Just one will be enough for an order, and the price is under $1 each. An SASE will get you Bob's photo list, and $5 will get you his highly illustrated plans catalogue, which, incidentally, includes the new Dennis Bryant 96-inch Fieseler Storch that many of you have been waiting for.

And the very best news of all this month comes out of Greensboro, NC. A letter just received from Anne Pepino confirms that she will indeed continue on with Scale Plans and Photo Service* and will add new inventory as it is needed. You may remember that her husband Jim passed away a few months ago, and Anne says that his wish was for her to carry on, and that's exactly what she will do, both with photo packs and plans.

NITTY GRITTY

You might recall that, a few issues ago, I mentioned a line of tools manufactured in England that had a cool kind of permanent grit molded right to their surfaces, making them the ideal sanding instrument. Well, the entire line of tools is now available through Bob Violett Models, now called BVM*, in Winter Springs, FL. I can't go into every type of tool offered at this time, but I will tell you that we purchased a few for our shop, and we've been very impressed. The selection includes several sanding blocks with two different grits on either side, round sanding tools, something like a file—skinny ones and fat ones. There are even special saws and Dremel attachments. You can't wear these things out with normal use. Yes, torches, vises and hammers will mar their surfaces, but for normal guys, Perma-Grit tools should last many years. Contact BVM with an SASE for a sales flyer and price list.

Until the next column, take a look at some of the pretty pictures of what our readers have been flying.

**Addresses are listed alphabetically in the Index of Manufacturers on page 127.* ■

Wingmaster Design Software

Use your PC to create and print your own wing designs

by TOM HUNT

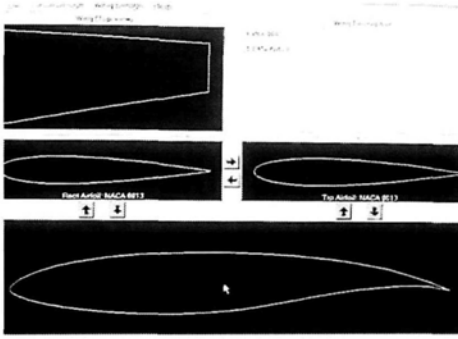
MANY MODELERS will tell you: "Anything that gets me out to the flying field faster is worth having." Wingmaster* model wing design program can add to that cause. Unfortunately, you can have so much fun using this program that you might find yourself taking time away from building or flying! Before you run out and buy a copy, your PC must have Windows 3.1, or later, and be running in 386 enhanced mode. Your computer will also require about two megabytes of hard-drive disk space.

Wingmaster does a very adequate job of laying out wing plans and wing ribs for just about any wing (or tail) you can think of. The program allows manipulation of all the basic wing-design parameters, i.e., wing sweep, tip and root chords, wing semi-span, curved or straight leading and trailing edges and, of course, airfoils. This all happens in real-time, on-screen, so the user can see the results immediately.

The program allows the user to choose from more than 320 airfoils in its database, and it can create NACA 4-, 5-, and 6-digit series airfoils. Although *all* airfoils can be modified in thickness, camber, maximum thickness position and maximum camber position, both the manufacturer and I strongly warn the reader that modifying airfoils can lead to disastrous results. Good airfoils can be made into poor airfoils by a quick keystroke! Different airfoils can also be assigned to the root and the tip to tailor the wing's aerodynamic properties. Again, the user is warned that this program does no aero-analysis, so a bad wing (aerodynamically speaking) can be designed quite easily. All of these design options allow the knowledgeable user to make wings that would be very difficult using the old "paper" medium.

AIRFOIL AND WING DESIGN

The program is broken up into two major sections: airfoil design and wing design.

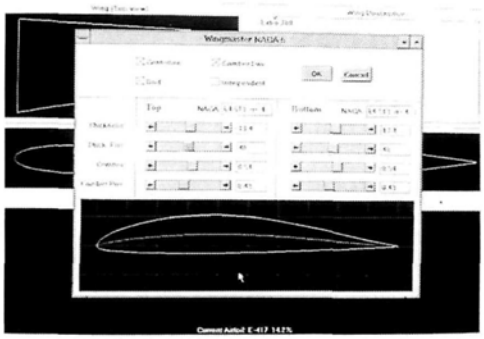


Wing design screen showing planform, root airfoil, tip airfoil and current airfoil. Different airfoils may be assigned to the root and tip, and you may select either a linear or a non-linear transition.

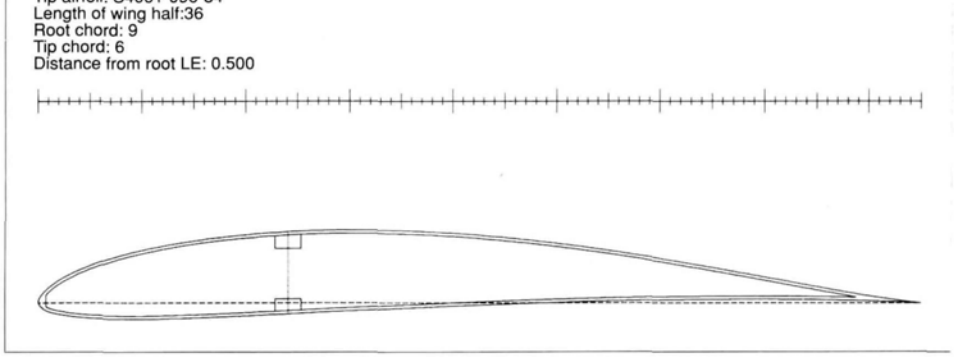
Airfoil design allows you to:

- choose from among stored airfoils;
- manipulate NACA airfoils;
- load your own airfoils from an ASCI text file.

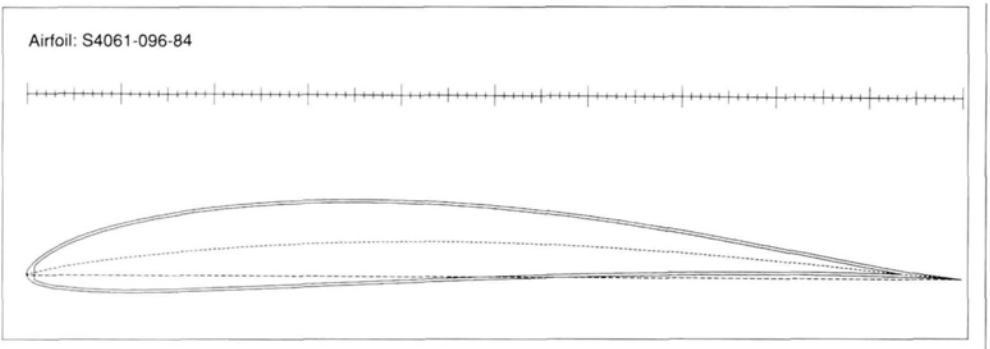
The list of stored airfoils from which to choose is quite extensive; there are more than 320 in the database. I won't attempt to list them all; suffice it to say that many popular sport and competition sailplane airfoils are available, as well as many sport aerobatic



Airfoil design screen. Choose from among the many stored airfoils, create your own, or modify an existing airfoil. Menu shows ordinates for top and bottom of airfoil in relation to straight or cambered center line.



Printout generated by Wingmaster. Tapered wing rib showing spar size and location. Note locatio specificaton "Distance from root LE"; this rib is .5 inches from root and follows the taper.



Wing rib printout showing both straight and cambered center lines.

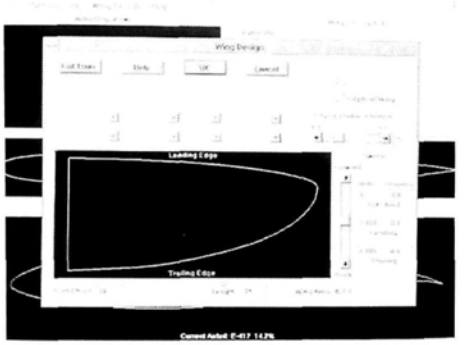
wing sections. These airfoils are assigned to the root and the tip in the airfoil-design section.

As I mentioned earlier, regardless of where the airfoil came from, it can be modified under the edit command. Camber, thickness and the maximum value position of each (in percent chord) can be altered. Also, the top and bottom curves can be altered separately.

In the wing-design section, the following rules must be observed:

- Wing shapes under consideration must have only a single taper.
- Multi-taper wing planforms (like most modern sailplane wings) must be created in panels separately, as if they were different wings.

Elliptical wings are created by selection of that option on the wing-design screen. If you choose different airfoils at the root and tip (shape, not chord), you're allowed to vary how the transition of "change over" from one airfoil to another will occur. You can select the linear option, and the wing airfoil will change proportionately along a straight line from root to tip. This is shown graphically on the screen in a separate window. If you make the transition curved (non-linear) with more change occurring out at the tip, you can move the curve position toward the tip, and the effect will be shown on the screen. Wing twist is not an option with the wing-design

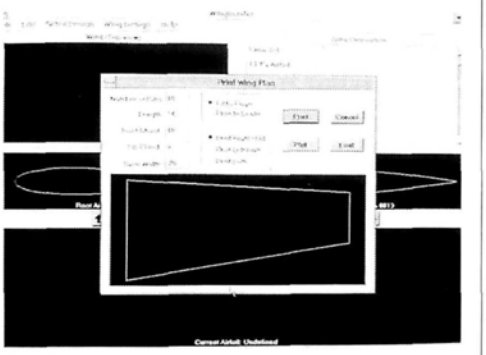


Wing Design. Drawing the planform. Elliptical wings can be drawn, as can tapered. Multi-tapered wings must be drawn as separate panels, which can be joined when printed.

parameters. If wing twist is necessary in your wing design, it must be accomplished on the building board.

SAVING AND PRINTING

Once the wing airfoil and wing planform have been assigned, the wing can be saved



Print Wing screen. Wingmaster can automatically provide registration marks so that muliple sheets can be aligned properly when printed.

under a name of the user's choosing under the "file" menu: sub-menu "Save Airfoil," "Save Wing," "Save Airfoil as" or "Save Wing as." The first time the wing or airfoil is written to the disk, use "Save as." Every other time the same wing is modified and saved, use the "Save" sub-menu. Note that wings are saved with the current airfoil, and airfoils are saved without wing data.

Printing your work so that you can build the wing you have designed so quickly that the field is only minutes away (don't you wish!!) can be done on many different printers. The file can be sent to a pen plotter or to other graphic software as an HPGL file. If the wing rib is bigger than the paper specified in the print-setup section, the software will automatically section the rib and put registration marks on each sheet so they can be taped together later.

This software will only produce ribs of equal distances apart. Many wing designs have some ribs at varying intervals because of flap or aileron trims and fuselage side

(Continued on page 115)

Wingmaster

Hits

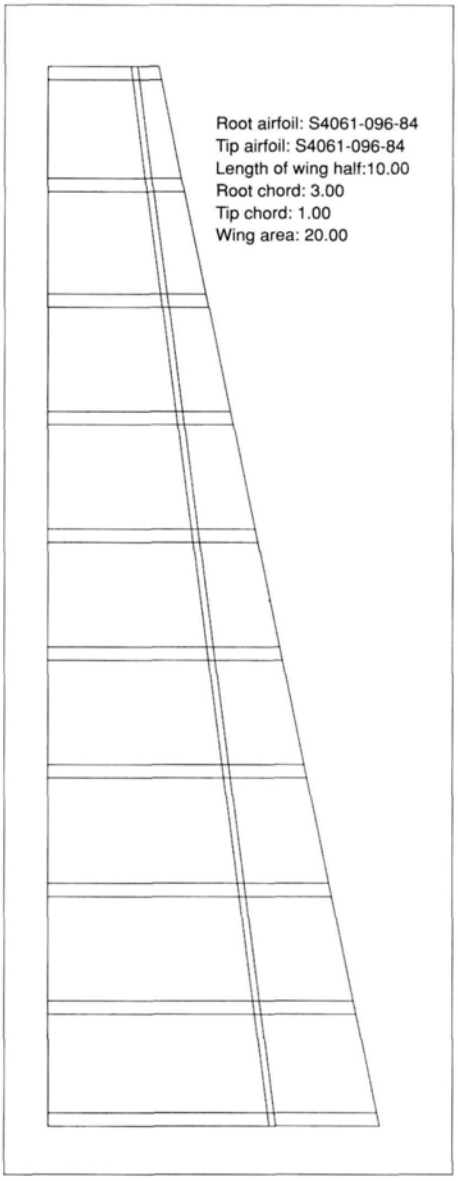
- Easy to use
- Windows environment
- Real time graphic updates on design changes
- Extensive airfoil library

Misses

- No input for wing twist
- No spar placement in "Print Airfoil" option

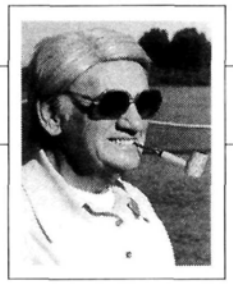
List price: $129.95

- Maintenance upgrades $5
- Major upgrades $20



Planform view showing spar and rib placement and wing taper.

GOLDEN AGE OF R/C



HAL DeBOLT

THE SMOG HOG

AS OUR R/C plane evolution outline progresses, we arrive at a design that calls for in-depth evaluation: Howard Bonner's fabulous Smog Hog. In pre-citizens-band times, R/C'er types were mostly ex-free-flighters and electronic gurus who were happy to just have flight. The advent of CB opened the door to the multitude, many of whom had considerable CL experience and aerobatics inclinations. This quickly changed the R/C fraternity.

Howard Bonner, with a Smog Hog forerunner that shows Rudder Bug influence; C-S 465-equipped; Bonner escapements; a Torp .35.

Shortly after CB had let so many in, Ed Rockwood and Frank Schmidt, with their reed systems, gave us separate elevator control. Experience encouraged us to add elevators to our existing planes, which looped and dove all over the sky. These pre-multi-channel, flat-bottom airfoil designs had marginal inverted-flight capability, so inverted maneuvers were out of the question. Because I was CL-oriented, I couldn't wait to get an R/C to fly inverted, so I went to work making modifications.

The design task proved rathe simple, even though I felt a grea deal of apprehension. I incorpo rated a symmetrical airfoi (NACA 65012) wing into th basic Live Wire (LW) Cruise design to create the "Over an Under" (O&U). I was immedi ately successful, and it was note that the symmetrical foil did littl to alter normal performance. A the '53 Nats, the O&U demon strated consistent inverted flight outside loops and other inverte maneuvers. To put it mildly, it performance opened many eyes. Few (if any) Californian R/C'er attended the '53 Nats, but wor of the demonstrations quickly spread west Meanwhile, Howard Bonner was develop ing, and doing well with, an R/C design fo competition flying that used a flat-botton wing. It was easy to modify his design wit a semisymmetrical wing. Howard used

FROM THE OT R/C MAILBOX

Though this information may be a bit dated, with our current focus on history, we can see that it's not forgotten!

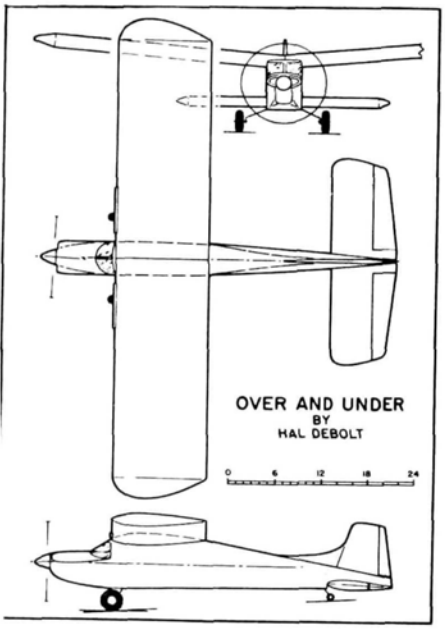
Wes Pettinger, from 1501 Banbury Ct., Richardson, TX 75082, was a neighbor of the Forester Bros. of Lanark, IL, and is chronicling their engine endeavors. He learned that several of us did some prototype engine evaluation for Forester so, when he needed confirmation of some facts, we gladly obliged. He recently produced a professiona-style test stand for the 99 Forester engine. He has confirmed that Forester provided Clinton Desoto with the twin 99 engine that powered the ARRL Cub project. If anyone has any pertinent information, Wes would appreciate your help.

Wes Pettinger's elaborate Forester "99" test stand. The black box is a modern switch that operates the 2-speed ignition.

At the '57 Nats, Hoyle Long prepares to launch his Wag-equipped modified LW

The following story exemplifies a com mon occurrence way back when: Bi Brown, of Forest City, NC, and his instruc tor, Hoyle Long, attended a large R/C mee at the Navel Air Station in Atlanta. Brown first Cruiser flight went well until the radi quit (you know the feeling) and allowe the Cruiser to free-flight into an adjacen "jungle." A search commenced, but to n avail; those Southern jungles can b almost impenetrable! On return to th flight line, Hoyle was nowhere to be seen but an onlooker said that their plane ha disappeared over a distant power line! Tw models, two flights and out; welcome t early R/C contests!

Not discouraged, the two men attende the '57 Nats. With a Champ this time, B completed the precision pattern nicely. C the return flight, though, the Champ had mind of its own, performing really fanc stuff! The judge yelled, "You need to ca



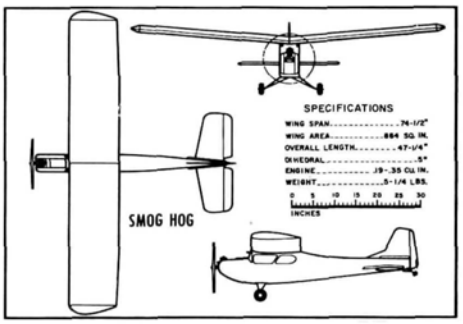
Hal deBolt's Over and Under introduced another inverted maneuver to R/C flight.

NACA 2415 airfoil, and the Smog Hog was born. The name itself was intriguing; the L.A. atmosphere was obviously an inspiration; one story says that the design was so utilitarian that no pretty name could describe it. Another story says that Howard had flown the original so much at the dirty, desert field that only a hog could relate to the result! Be that as it may, the Smog Hog performed extremely well. Howard must have made the plans available because before long, any West Coast R/C'er who was anybody had a Hog in his stable!

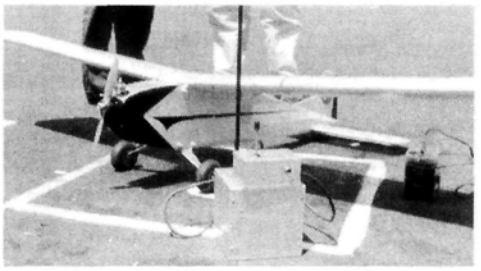
With its competition debut, the Smog Hog was an instant success and easily won the '56 Nats, as well as some lesser meets. Howard even flew it single-channel with cascaded Vari-Comp escapements to win the California Intermediate Class event!

For the following year, ailerons were added to the Hog and, with this version, Bob Dunham was able to win the first of his several national championships.

A rumor is that Bill Winter got on



This three-view shows the utilitarian features of Howard Bonner's famous Smog Hog.



Unknown modeler's modified Over and Under Nats entry. There appears to be a new Schmidt 5-channel reed system in the foreground.

Howard's case to write a *Model Airplane News* construction article; but Howard was too busy to write one, so the article was turned over to R. E. Bowen. *Model Airplane News* published it in the February 1957 issue; after that, many were built.

NOT JUST ANOTHER PRETTY PLANE

Bowen's article about the Smog Hog describes it as much more than just a competition machine. When it was used with less power (a .19 engine for training-style flight and a .35 for competition flying), its "automatic recovery" feature made it an ideal trainer. "Automatic recovery" was a desired feature for all early R/C designs. It was a great advantage if a model could recover itself from abnormal attitudes that were caused by common pilot errors and radio malfunctions. It would be an asset for today's beginners, too.

Otherwise, the Smog Hog introduced some practical features that took some of the pain out of R/C model use. The adoption of the Live Wire-style, rubber-band-attached, "knock-off" landing gear was one. Rather than use the LW's aluminum gears, Howard adapted the rubber-band-attachment idea to the traditional wire gears. Today, we recognize the problems caused by the inevitable "hard landings." The change to a high wing was a major help. So much had still to be learned and improved!

Store-bought engine mounts were yet to come; we all used maple engine beams. Those hard landings had a way of eating those beams. Howard's solution was to set the beams wide apart and connect them with a plywood "plate." A notch in the plate allowed various engines to be used in the same plane—just have a separate plate

your maneuvers." Bill replied, "Heck, I ain't got it," just as the Champ did a cartwheel and came to a stop. As you might have guessed, Bill's nickname became, "Call your maneuvers, stupid!"

I wonder why everything can work so well before a meet, then go so wrong during one. Could it be Murphy's law at work?

Aubrey Foster of Ft. St. John, British Columbia, Canada recalls that he had two F&M propo systems that performed flawlessly; they were labeled "Digital 58." Does that name ring any bells for anyone? He says that the F&M in his LW Jenny was his first successful R/C system and that it provided some great flying.

Dick Bohls of Arlington, TX, wrote to say that Live Wires were his "thing" in the early days. He enjoyed the Kitten; it was powered by a .049 McCoy diesel and guided by a Control Research, Lorenz-tyle, "2-tuber." He'd like to fly that one again, but he needs the plans. (Most LW plans are available from Fran Ptaskiewitcz at 23 Marlee Dr., Tonawanda, NY 14250.)

Dignitaries at the '57 Nats—Walt Good and Al Diem—discuss "monsoon-created" problems with event director Ron Chidgey.

I must close with some disturbing news: recall Orbit and the infamous black boxes? I have heard that our old friend Bob Dunham has a serious health problem, and I'm sure that he'd appreciate hearing from all of you. You can write to him at 2490 Beverly Glen Dr., Lake Havasu City, AZ 86403.

Howard Bonner, with kind advice from Bob Dunham, assembles his Smog Hog at the '57 Nats. Notice the Orbit reed transmitter.

for every engine. These soon became known as "break-away" mounts because, if you were lucky, the *plywood* would break, instead of those beastly beams! Obviously, this was a utilitarian model!

INVERTED-FLIGHT TANK

Back in CL days, a point came when inverted flight was made possible. This created a need for a fuel tank that would be suitable for inverted flight. A number of Rube Goldberg-style concepts were tried, including the use of two outlet tubes, a "revolving" tank and, perhaps the simplest, Dmeco's Swivel Tank. This being before plastic, the tank had to be of metal, and Dmeco's version featured a centrally mounted outlet tube that had an internal swiveling pick-up tube mounted on it. Because CL was so popular, these were widely used—particularly after inverted flight was made possible. Of course, the tanks were re-engineered to fit R/C needs, which included larger tanks and an internal muffler-like baffle. They were not something easily produced in the home hobby shop, but they were available and did the job!

Howard then adopted the new tank concept to create one that almost anyone could produce in his own home shop. He was able to do this because, at this time, an enterprising bottle maker produced the first polypropylene plastic bottle. The Wilhold glue company offered their product in one of these bottles so that you could squeeze out the glue completely (solving what had been an irritating problem). With an empty, clean, Wilhold bottle, you could drill the necessary holes in its metal cap and solder the needed tubes through it. Howard ingeniously used surgical-rubber tubing with a weight on the end for the pick-up and the outlet. Thus, the "clunk" tank was born!

Soon, modelers were searching store shelves for just the right size of bottle to suit their particular model's needs. Naturally, we soon had commercial versions of the tank made by companies such as Sullivan and Dmeco. Today, there are so many varieties available that it's easy to find one that suits any model.

Then there is the utilitarian aspect again: the area immediately behind the Hog's engine was left open, and the tank was held in place by a rubber band—appearance be darned! There's a story in which a Smog Hog flier went inverted and its tank dropped out of the cavity (a forgotten rubber band?) and hung by the fuel line; when the plane returned to upright, the tank promptly fell back into the cavity!

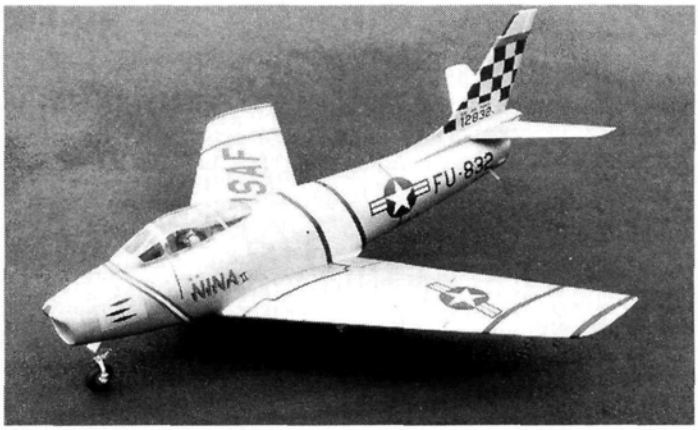
It's strange that a kit was never made for such an outstanding design; although many copies were made from the plans that were printed in the *Model Airplane News* article. (Smog Hog specifications: wingspan—74 inches; wing area—6 square feet; weight—5¼ pounds; engine—K&B Torp .35; radio—Carl Goldberg Models 5-channel reeds.)

If you enjoy OT R/C, this is your place! ■

JET BLAST

GEORGE LEU

WORLD JET MASTERS IN GERMANY



My Jet Hangar Hobbies F-86 is a good example of an aluminum-finished jet. It's powered by a K&B 7.5cc engine with a Mac* pipe; it has Rhom-Air* retracts and a JR* radio; it weighs 8.5 pounds—ready to fly.*

THE LOCATION of the first F4J Scale Jet World Masters has been changed from the ex-NATO Air Base at Leipheim, Germany, to Erding Air Base, near Munich. Erding is an active German Armed Forces airfield at which a maintenance unit for Tornado aircraft is currently stationed.

With the cooperation of General Jaunig and Colonel Stehli of the German Air Force Support Command in Cologne, the event's new site will satisfy all the requirements necessary for a Masters competition of this magnitude. The Deutscher Modelfliegerverband (DMFV)—the German model fliers' association—has agreed to host the event and has made arrangements for the transportation of model aircraft (in boxes) from Munich airport to Erding Air Base.

The event will be held August 21 to 27, 1995, with alternate dates of September 2 to 10, if any problems arise with the original dates. Base hangars will be used as storage and maintenance space for the model aircraft, and each team will be given its own work area with tables, electric hookup and lights.

FLIGHT SCHEDULE

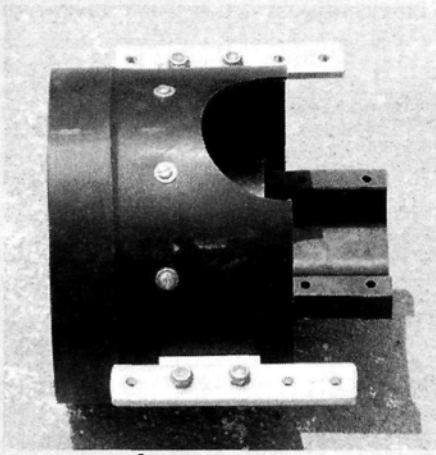
The provisional program, which is outlined below, should allow all the competitors to make some practice flights on the airfield to become familiar with the surroundings and with the weather conditions. Each country's team will be allocated at least two 30-minute flying slots during the practice days.

- **Saturday**—arrival and practice.
- **Sunday**—practice and opening ceremonies.
- **Monday**—practice and start of static judging.
- **Tuesday**—conclusion of static judging and start of flying competition.
- **Wednesday**, **Thursday** and **Friday**—flying competition continues.
- **Saturday**—conclusion of flying competition, results and contestants banquet.
- **Sunday**—awards, closing ceremonies and air show.

AN INVITATION TO FLY

Every country, worldwide, has been invited to send competitors—a maximum of five pilots/models per country

REDUCING NOISE WITH ANTI-VIBRATION FAN MOUNTS

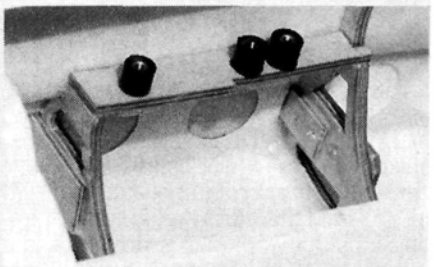


I used these 3/16-inch-thick aluminum plates to attach my fan unit to the Sullivan Flex Mounts.

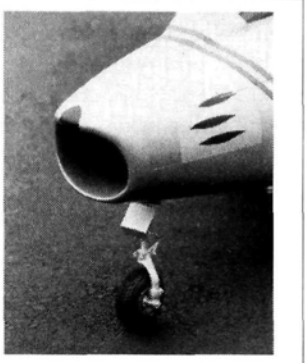
Both the noise and vibration caused by the high-revving ducted-fan engine setup contribute to radio system damage and the loss of parts within the airframe. In an effort to reduce engine vibration in the airframe, I use Sullivan* Flex Mounts to support a plate onto which the ducted-fan assembly has been bolted.

The fan assembly will not resonate with as much noise if you position it away from the airframe rather than attaching it to the fuselage. I use three Flex Mounts because they are firm enough to rigidly support the fan setup but flexible enough to reduce vibration and noise. I hope my diagram will be sufficient to help you build your own unit.

I currently use this system—the idea for which came from Reto Senn—in my HT Modellbau Mirage 2000 aircraft, and the noise and vibration levels have definitely been reduced.



The Sullivan Flex Mounts are bolted to th plywood plates and are ready to receive m fan unit. Three mounts on each side provid good support while being flexible enough t reduce engine noise and vibration.



The Sabre (above and center) is covered with Foley's Aluminum Detailing Foil; notice how it conforms to the cockpit contours. The "NINA II" graphic is painted on. The inlet contour (right) is done with aluminum paint; the Aluminum Detailing Foil and Presto cover the rest of the fuselage.

Countries that have more than five pilots who wish to participate must hold selection or qualifying events to determine who their team members will be. Pilots who are interested in competing in the World Masters competition should contact their National Aero Club, Modeling Federation, or an International Jet Model Committee (IJMC) member in their country for further details of how to qualify for their national team.

U.S. SELECTIONS

In the United States, the Jet Pilot's Organization (JPO) will handle the selection of our team. The JPO competition committee consists of Del Ellis, Art Arro and me. We will take into account current and past competition scale performances; it's unlikely that any one event will be created to select a U.S. Team. Information about the process will be forthcoming in the JPO newsletter.

JET PILOT'S ORGANIZATION

If you want to belong to a group of dedicated jet modelers, then you should join the Jet Pilot's Organization.

The JPO was started in 1987 and has been growing in membership and stature ever since. Currently, it's a recognized special interest group for the AMA, and it's involved in all jet aircraft decisions within the organization.

Printed on glossy paper with black-and-white and color photos, the JPO's newsletter—*Contrails*—is devoted entirely to fan-jet and turbine-powered aeromodeling. The newsletter contains coverage of fan-fly events, how-to articles, helpful hints, kit reviews and engine tips.

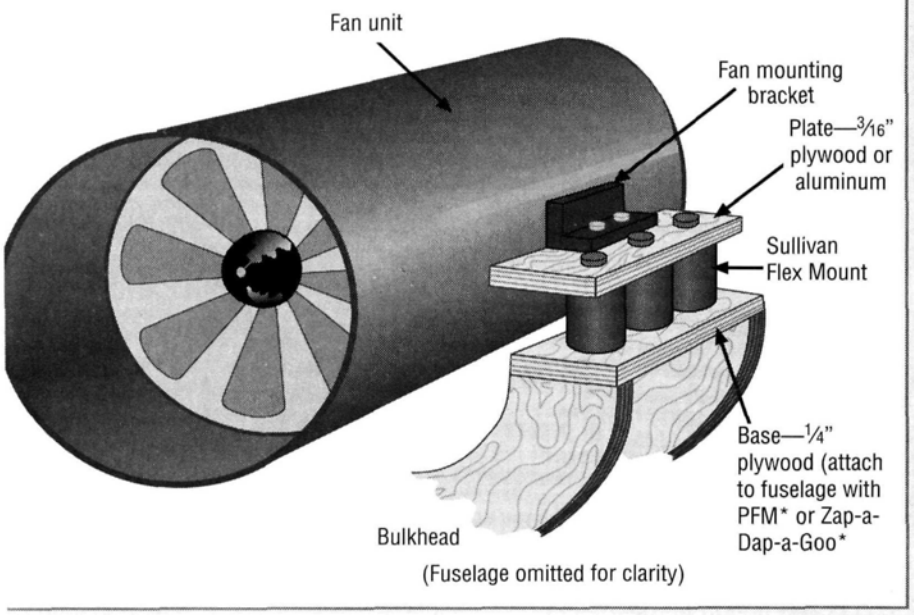
JPO has a syllabus for contest directors who wish to hold a jet rally or a fan-fly-type event. A limited number of fan flys will be JPO-sanctioned, and applications are available from the JPO. Two sets of electronic speed traps with defined procedures are also available to help conduct speed runs safely and efficiently at JPO-sanctioned events.

I am the JPO president, and there are 18 officers and representatives throughout the U.S., Canada, Australia, New Zealand, Germany and England. They help to coordinate fan jet activity and actively recruit new members.

If you are interested in fan-jet activity, you should seriously consider joining the JPO. You can obtain a membership application from Mrs. Donna Lines, 7964 Hillside Ct., Rome, NY 13440. I guarantee that you will not be disappointed.

The address of the DMFV is Rochusstrasse 104-106, D-53123 Bonn, Germany; telephone 01149 228-978500; fax 01149 228-978085. You can also contact event organizer Winfried Ohlgart at Stauffenbergstr. 42, D-53359 Rhinebuch, Germany; telephone 01149 2226-12343; fax 01149 2226-7097.

exible Fan Unit Mount Detail



ALUMINUM FINISHES FOR JETS

I often choose, as subjects for my scale models, jets that are unique or that have a color scheme that has not previously

been seen at scale competitions. I also select subjects that fly well. Sometimes, however, a contradiction develops between my choices. I am referring to the F-86, F-100 and F-89 that all use aluminum as a base color and require that all their other markings be applied over it.

Aluminum finishes are difficult to realistically capture on scale models, especially if you use paint. I have found that a combination of paint, MonoKote*, Presto* and Aluminum Detailing Foil provides an aluminum metal finish that looks quite realistic.

The photos of my Jet Hangar Hobbies* F-86 show the realistic effect I obtain when I mix and match paints and plastic trim sheets. I've found that the Aluminum Detailing Foil from Foley Mfg.* works the best when you're applying a metal finish to a scale model.

This material has a specially formulated, pressure-sensitive adhesive to ease the application and allow permanent bonding. It's only 0.002 inch thick, which allows it to conform to most compound curves, and it has a topcoat to which paint adheres well. You trim the Aluminum Detailing Foil with scissors or a knife and, if you aren't satisfied with its appearance, you can pull the foil off and re-do the specific area on which you were working. (I will have in-depth accounts of how to apply Aluminum Detailing Foil in the upcoming kit reviews of the Usher F-100 and the ETA F-89).

**Addresses are listed alphabetically in the Index of Manufacturers on page 127.* ■

A single-channel, on/off system for micro flight

PRODUCT REVIEW

CETO Mini R/C System

by JOE WAGNER

SPECIFICATIONS

Type:
single-channel, single-function aircraft R/C system

Frequency:
27MHz amplitude modulation (AM), audio-modulated output @ 500Hz (nominal)

Transmitter power:
9.6V to 12V DC
(8 AA cells, not included)

Receiver power:
3.6V DC, 30mAh
(3 button-type Ni-Cds included)

Receiver dimensions:
$^{13}/_{32}$x$^{9}/_{16}$x$^{3}/_{4}$ in.;
weight—4 grams

Actuator dimensions:
$^{9}/_{32}$x$^{15}/_{32}$x$^{11}/_{16}$ in.;
weight—2 grams

Actuator operation:
2-position only; motion—0.10 in.; force—1 gram

Flight-pack power consumption:
1.5mA at idle; 45mA with on-signal

Total flight-pack weight:
12 grams

Price: $109.95

AT LAST, THERE'S a commercially available model airplane R/C system with an "airborne package" that weighs less than ½ ounce. At 12 grams complete (batteries, receiver, actuator and all the wiring), the CETO, distributed by Hobby Lobby Intl.*, has the smallest and lightest R/C flight pack ever mass-produced. It weighs slightly less than a dime and two nickels! The CETO system comes in an attractive, rugged, yellow plastic carrying case that's lined on the bottom inside with resilient plastic foam.

The CETO transmitter features a tuned antenna, an LED battery-condition indicator and a charging socket for the RX batteries that beeps when you press the control-switch button.

FLY-WEIGHT FLIGHT PACK

Of course, for 12 grams, you can't expect multi-channel, digital proportional control. The CETO is a single-channel (27MHz AM), single-function system. Its tiny actuator (about the size of a sugar cube) *looks* like a servo, but it's really a two-position magnetic device. With signal "Off" from the transmitter, the actuator arm is positioned about 15 degrees from the straight-across position. With signal "On," the arm snaps clockwise about 35 degrees, providing a linear motion of 0.10 inch with a force of approximately 1 gram. That's surely not much power, but for a slow-flying airplane, 1 gram is enough force to operate a rudder tab that's about ⅜ inch wide by 1½ inches high, provided the tab is very freely hinged.

The CETO receiver is a "super-regenerative" type, with a current drain of only 1.5mA in the signal-off state. With signal-on, the combined drain of the receiver and actuator is about 45mA. This means that the CETO's 3-cell, 30mAh Ni-Cd battery pack, which weighs 6 grams, including its case, switch and wiring, can operate the flight pack for more than hour—assuming equal and off signaling.

TINY TRANSMITTE

The CETO transmitter powered by eight AA-s batteries (not include Typical alkaline cells p vide sufficient power something like 12 ho of operation. You c easily tell when the b tery becomes low: t transmitter features multicolor LED batte voltage indicator. T glows a vivid green wh the voltage is ample; yell with marginal voltag and red when the batte becomes too low to fly wi

The CETO's transmit antenna is short, thick a plastic-coated, with a coa push-on connector. Its op ation seems different fr that of our usual 72 to MHz R/C systems. Grou range with the transmit antenna removed is only feet, but with the ante back on, I got good grou level response at 50 ya Range in the air, of cou will be much greater. I ne expect to fly the 32-in span airplane that will uti the CETO system any ther away than a couple hundred feet. It will be ju shapeless dot in the sky greater range. Each time press the CETO transm ter's control-switch but an audible tone sound

PHOTOS BY JOE WAGNER

The CETO comes in a thick-walled, bright-yellow, plastic carrying case. Everything is attached to the foam liner with elastic loops.

esumably to assure
u that something is
ppening.

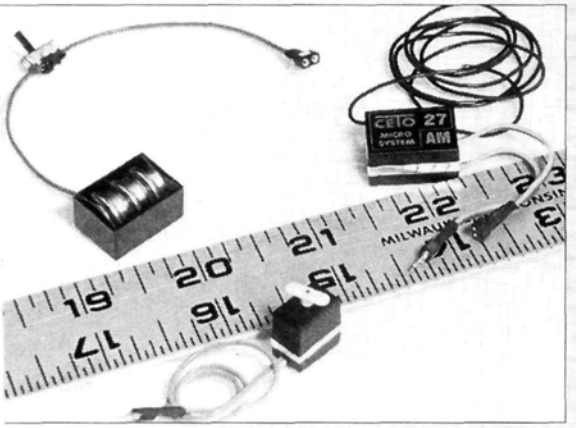
CHARGING THE SYSTEM

e flight pack's batteries
recharged from the
nsmitter through a sup-
ed charge cord. This
d appears to be simply
hort length of small-
uge, two-strand wire

ity is to replace the 1700-ohm resistor with one of a lower value. For example, 1000 ohms will provide a recharge current of 9mA.

WHERE WOULD YOU USE THIS SYSTEM?

This single-function radio system is ideal for tiny, low-powered airplanes: gliders, mini-electrics, rubber-powered and CO_2.



sub-micro size of the CETO's airborne components is obvi- in this picture. Its light weight is also impressive: 12 ns! (28.4 grams = 1 ounce).

larger Browns.

- Don Srull-style mini-electrics.
- The CETO is great for ½A-size gliders, plus most of the old-time Frank Zaic "Thermic" designs.

CETO CONTROL CHARACTERISTICS

There are two flying styles possible with the CETO system. One is to set the model up to fly straight with no signal, then turn in only one direction when the signal is on. The other is to adjust the model and its rudder tab so it turns in one direction with on-signal, then in the other direction with off-signal. With this setup, straight flight could be achieved (more or less) by pulsing the transmitter button. In fact, it wouldn't be difficult or expensive to make an add-on electronic pulser for the transmitter so that it would function like the old Ace R/C Pulse Commander and provide single-channel, micro-proportional R/C.

As for me, I've chosen to put my first CETO system into a ⅓-scale model of the original Good Brothers' Nationals-winning (three times: 1939, '40 and '41) R/C airplane (now in the Smithsonian Air & Space Museum) in its 1939 rudder-only configuration. At 32 inches of wingspan and 150 square inches of wing area, my little "Big Guff" replica ought to perform just like its prototype, if I can keep the ready-to-fly weight around 5 ounces. Even with electric power, that shouldn't be hard to accomplish.

**Addresses are listed alphabetically in the Index of Manufacturers on page 127.* ■

ı a mini phone jack on
end and a micro, two-
ıg plug on the other.
there's slightly more
than that: inside the
body is a 1700-ohm
stor that's wired in
:s to the positive wire.
reduces the receiver-
:ry charging current to
ıt 5mA, which is very
:ssary when recharg-
a flight pack made of
ıAh, 3.6V Ni-Cds
ı the 12V transmitter
:ry! At 5mA, it will
about 10 hours to
y charge a depleted
ver pack.
ooking at it another
, you can partially
ırge the receiver pack
een flights, figuring a
mum of 5 minutes of
ırge time per minute
xpected flight dura-
Still another possibil-

Flying lightweight R/C models like these indoors offers a whole new aspect of R/C fun! Flying outdoors with the CETO system calls for calm weather, mostly because the minuscule actuator doesn't have sufficient power to work the rudder of a model that flies fast enough to make headway into a brisk breeze.

Still, there are many types of suitable outdoor models for the CETO. Here are some suggestions:

- Rubber-powered airplanes with 120 to 180 square inches of wing area, such as the classic Earl Stahl-designed scale types that *Model Airplane News* published years ago.
- CO_2 models powered by Modela motors and the

INGMASTER

(ntinued from page 85)

ls. Some ingenuity is required on the r's part to work around this problem. It is sible to create and print a single rib with- creating an entire wing, as long as you w the exact chord you will need. This is e while in the airfoil design section under nt Airfoil."

n either printing option ("Print Wing s" or "Print Airfoil"), Wingmaster allows user to specify sheeting thickness, and rs a choice to print the center line, cam- line, zero lift line, or a ruler. Specifying size, however, can only be done in the int Wing Ribs" option. It would have n nice to specify the spar size in "Print foil" so that intermediate wing ribs could e been generated in this section. I have to eve that the "Print Airfoil" routine was tten for those who make foam wing- s, which have no spar. Also note that the size is input as height and width and is ed at the thickest part of the airfoil cho- (not always the most convenient place, certainly where one will benefit from the test strength.)

ne third printing option, "Print Wing ," will print (segmented, to fit the paper) and right wing panels or both at the same . Again, registration marks are included ach sheet so that the modeler can "paste" sheets together to create an entire wing from tip to tip.

OTHER FEATURES

nteresting, but less useful (with respect signing and building a wing) part of this ram is the ability to copy an airfoil (as a nap clipboard) from the Airfoil Design on and paste it into a word-processing ment or any other windows application. click with the mouse on the graph win- of the airfoil, and select the "Copy" ion under the edit menu. Open the new lows application, and paste the airfoil a new document.

(Continued on page 129)

INDEX OF MANUFACTURERS

Airtronics Inc., *Autry, Irvine, CA 92718; (704) 830-8769.*

Altech Marketing, *P.O. Box 391, Edison, NJ 08818-0391; (908) 248-8738.*

Astro Flight Inc., *3311 Beach Ave., Marina del Rey, CA 90292; (310) 821-6242.*

Aveox, *P.O. Box 1287, Agoura Hills, CA 91376; (818) 597-8915; fax (818) 597-0617.*

Balsa USA, *P.O. Box 164, Marinette, WI 54143.*

Bob Holman Plans, *P.O. Box, 741 San Bernardino, CA 92402; (909) 885-3959.*

Bob Smith Industries, *8060 Morro Rd., Atascadero, CA 93422; (805) 466-1717; fax (805) 466-3683.*

Boxmeyer Composites, *P.O. Box 6165, Philadelphia, PA 19115; (215) 333-8833.*

BVM, *170 S.R. 419 Lader Springs, FL 32708; (407) 327-6333.*

Byron Originals, *P. Box 279, Ida Grove, IA 1445; (712) 364-3165; fax (712) 364-2028.*

Carl Goldberg Models, *34 West Chicago Ave., Chicago IL 60651; (312) 626-9550.*

Century Jet Models, *216 Bluegrass Pkwy., Louisville, KY 40299; (502) 266-9234; Fax (502) 266-9244.*

Cermark Electronics, *107 Edward Ave., Fullerton, CA 92633.*

CETO; *distributed by Hobby Lobby Intl. (see address below).*

Clancy Aviation, *219 W. 2nd Ave., Mesa, AZ 85210-1317; (602) 649-1534.*

Coverite, *420 Babylon Rd., Horsham, PA 19044; (215) 672-6720; Fax (215) 672-9801.*

Cox Hobbies, *350 W. Rincon St., Corona, CA 91720.*

CS Flight Systems, *31 Perry, Middleboro, MA 02346.*

DAD (Design & Development Corp.), *Main St., P.O. Box 711, Chadron, NE 69337; (800) 669-4548.*

Dan Parsons Products, *709 Fulmer Dr. N.E., Albuquerque, NM 87111.*

Dave Brown Products, *Mayhigh Rd., Hamilton, OH 5013; (513) 738-1576; Fax (513) 738-0152.*

Davey Systems. *75 Tower Ln., West Chester, PA 19380.*

Design & Development *(see DAD above).*

Don Smith Plans, *219 Goolsby Blvd., Deerfield Beach, FL 33442; (305) 570-7551.*

Du-Bro Products, *480 Bonner Rd., Wauconda, IL 60084; (800) 848-9411; (800) 848-9411.*

Estes Industries, *1295 H St., Penrose, CO 81240; (719) 372-6565; fax (719) 372-3419.*

F.T.E., *15300 Estancia Ln., W. Palm Beach, FL 33414; (407) 795-6600.*

Flightec, *21 Juniper Way, Hamilton NJ 08619; (609) 584-9409.*

Foley Mfg. Inc., *P.O. Box 245, Roanoke Rapids, NC 27870; (919) 537-5237*

Fred W. Spring; *32 Austin Blvd., Picnic Point, 2213, Sydney, Australia.*

Futaba Corp. of America, *4 Studebaker, Irvine, CA 92718; (714) 455-9888.*

Gerard Enterprises Inc., *W226 N825 Eastmound Dr., Waukesha, WI 53186; (414) 521-0547; (414) 521-0551.*

Global Hobby Distributors, *10725 Ellis Ave., Fountain Valley, CA 92728; (714) 964-0827.*

Graupner; *distributed by Hobby Lobby Intl. Inc. (see address below).*

Great Planes Model Distributors, *P.O. Box 9021, Champaign, IL 61826.*

Hi-G Promotions Inc., *P.O. Box 219181, Houston, TX 77218-9181; (800) 741-7058.*

Hiline (KRC), *P.O. Box 11558, Goldsboro, NC 27532; (918) 778-6653.*

Hitech/RCD Inc., *10729 Wheatlands Ave., Ste. C, Santee, CA 92071-2854; (619) 258-4949; fax (619) 449-1002.*

Hobby-Tec, *P.O. Box 220762, Santa Clarita, CA 91322; (805) 254-4242.*

Hobby Lobby Intl., *5614 Franklin Pike Circle, Brentwood, TN 37027; (615) 373-1444; fax (615) 377-6948.*

Hobby Shack, *18480 Bandilier Cir., Fountain Valley, CA 92728-8610; (714) 962-0827.*

Hobby & Tool of America, *P.O. Box 548, Rocky Hill, NJ 08553-0548; (908) 281-5544; fax (908) 281-5544.*

Institute of Silent Flight, *P.O. Box 430, Morgantown, PA 19543.*

Jet Hangar Hobbies, *12130 G. Carson St., Hawaiian Gardens, CA 90716; (310) 429-1244; fax (310) 429-6648.*

Jomar Products, *3440 Riverhills Dr., Cincinnati, OH 45244; (513) 271-3903.*

JR Remote Control; *distributed by Horizon Hobby Distributors, 4105 Fieldstone Rd., Champaign, IL 61821; (217) 355-9511.*

K&B Mfg., *2100 College Dr., Lake Havasu City, AZ 86403; (602) 453-3030; (602) 453-3559.*

KRC (video); *John Hickey, 1624 Maple Ave., Hatfield, PA 19440.*

Kress Jets, *4308 Ulster Landing, Saugerties, NY 12477; (914) 336-8149; fax (914) 336-5975.*

Lanier RC, *P.O. Box 458, Oakwood, GA 30566; (404) 532-6401; fax (404) 532-2163.*

Lite Machines, *1132 Anthrop Dr., West Lafayette, IN 47906; (317) 463-0959; fax (317) 463-6253.*

Mac's, *7935 Carlton Rd #A, Sacramento, CA 95826; (916) 456-6932.*

Major Decals, *21 Fisher Ave., East Longmeadow, MA 01028.*

Midwest Products, *P.O. Box 564, Hobart, IN; (219) 942-1134; fax (219) 942-1134.*

Model Electronics Corp., *6500 6th Ave. NW, Seattle WA 98117.*

MonoKote; *distributed by Great Planes Model Distributors (see address above).*

New Creations R/C, *P.O. Box 496, Willis, TX 77378; (409) 856-4630.*

O.S.; *distributed by Great Planes Model Distributors (see address above).*

Pacer Technology, *9420 Santa Anita Ave., Rancho Cucamonga, CA 91730.*

PFM; *Innovative Model Products, P.O. Box 4365, Margate, FL 33063.*

Prazi Sales & Service Center, *5151 Oceanus Dr., Ste. 109C, Huntington Beach, CA 92649; (714) 379-1380; (800) JR LATHE.*

Presto; *distributed by Coverite (see address above).*

Quadra-Aerrow Inc., *P.O. Box 183, Perth, Ontario, Canada K7H 3E3.*

RA Cores, *P.O. Box 863, Southbridge, MA 01550; (508) 765-9998.*

Rhom-Air, *8936 SW 129th Ter., Miami, FL 33176; (305) 232-6615; fax (305) 232-6818.*

Robart Mfg., *P.O. Box 1247, 625 N. 12th St., St. Charles, IL 60174; (708) 584-7616; fax (708) 584-3712.*

Robbe Model Sport, *170 Township Line Rd., Belle Mead, NJ 08502.*

Royal Products Corp., *790 West Tennessee Ave., Denver, CO 80223; (303) 778-7787.*

Saito; *distributed by Horizon Hobby Distributors, 4105 Fieldstone Rd., Champaign, IL 61821; (217) 355-0022.*

Scale Plans and Photo Service, *3209 Madison Ave., Greensboro, NC 27403; (910) 292-5239.*

Sermos R/C Snap Connectors Inc., *Cedar Corners Stn., Box 16787, Stamford, CT 06905.*

Short Blast Radio Control Hot Air Balloons, *P.O. Box 75336, Albuquerque, NM; (505) 836-7444.*

Sig Mfg. Co., *401 S. Front St., Montezuma, IA 50171; (800) 247-5008; fax (515) 623-3922.*

Slegers Intl., *Rte. 15, Wharton, N.J. 07885; (201) 366-2525.*

Soundmaster; *distributed by Davis Diesel Development, P.O. Box 141, Milford, CT 06460; (203) 877-1670.*

SR Batteries Inc., *Box 287, Bellport, NY 11713; (516) 286-0079; fax (516) 286-0901.*

Sullivan Products, *P.O. Box 5166, Baltimore, MD 21224.*

Thunder Tiger, *2430 Lacy Lane #120, Carrollton, TX 75006; (214) 243-8238.*

Top Flite Models; *distributed by Great Planes Model Distributors (see address above).*

Tru-Turn, *P.O. Box 836, South Houston, TX 77587; (713) 943-1867.*

USRA, *9114 Bent Spur Ln., Houston, TX 77064; (800) 741-7058.*

Windsor Propeller Co., *3219 Monier Circle, Rancho Cordova, CA 95742; (916) 631-8385.*

Wing Mfg. *306 E. Simmons St., Galesburg, IL 61401; (309) 342-3009.*

Wingmaster; *distributed by Websoft Inc., 287 Cottonwood Pryor, OK 74361; (918) 825-2220; fax (918) 825-7205.*

YS; *distributed by Futaba Corp. of America (see address above).*

Zap/Zap-a-Dap-a-Goo; *distributed by Pacer Technology (see address above).*

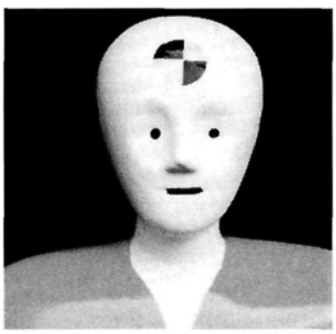
PRODUCT NEWS

AEROLOFT DESIGNS
Panel Line Ink

Designed to be used with a technical pen, this ink dries instantly and doesn't smudge. It comes in many colors, including red, blue and violet, and the black and white inks may be mixed to create any shade of gray. The starter kit, with which you can detail at least 20 models, comes with instructions, a 2-ounce bottle of ink (in your choice of color) and 4 ounces of developer (used for cleanup and to thin the ink). Aeroloft Designs also offers technical pens. For more information and a product catalogue, send $3.

Prices—$15.50 (starter kit); $15 (technical pen).

Aeroloft Designs, 2940 W. Gregg Dr., Chandler, AZ 85224; (602) 838-0447; fax (602) 491-2367.



BOB DIVELY MODELS INC.
Crash-Test Dummy Pilots

You won't need to make up any more excuses for having crashed your plane; this new crash-test dummy pilot will take the blame. It's currently available in 1/5 scale.

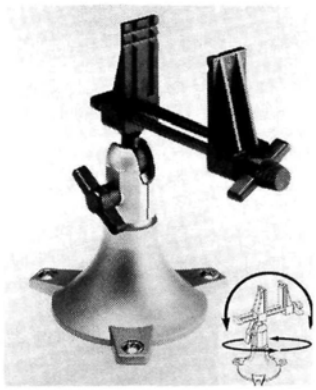
Price—$4.95.

Bob Dively Models Inc., 28001 Chagrin Blvd., Ste. 206, Woodmere, OH 44122; (216) 292-6926; fax (216) 292-7153.

WINDSOR PROPELLER CO.
Master Airscrew Scimitar Profile Propellers

Three new sizes in the Scimitar Profile Series of propellers have been released: 10x5, 11x8 and 12x8. These props have the sleek scimitar shape with sweptback narrow tips and undercambered blades. This design delivers greater thrust at low rpm (and decibels). These competition props are available in 15 sizes in charcoal gray glass-filled nylon. For a free catalogue, send an SASE to Windsor Propeller.

Windsor Propeller Co., 3219 Monier Cir., Rancho Cordova, CA 95742.

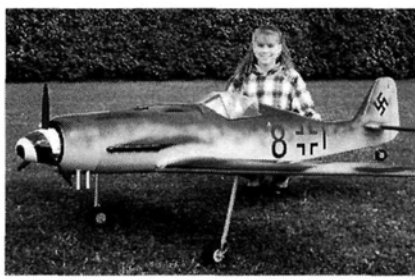


PANAVISE PRODUCTS INC.
PanaVise Jr

This 1-pound, 4-ounce vise has a head that's designed to rotate and swivel to 360 degrees and to pivot 210 degrees. The Jr's jaws are made of fiber-reinforced, thermal-plastic alloy, and they can open as wide as 2 7/8 inches. The base, which fits all PanaVise base mounts and can be screwed down or bolted to any work surface, is made of die-cast zinc. The PanaVise Jr is perfect for soldering, drilling, painting, gluing and assembling, and can be found at most hardware outlets, hobby and tool shops and electronics service centers.

Price—$19.95.

PanaVise Products Inc., 1485 Southern Way, Sparks, NV 89431; (702) 353-2900; fax (702) 353-2929.

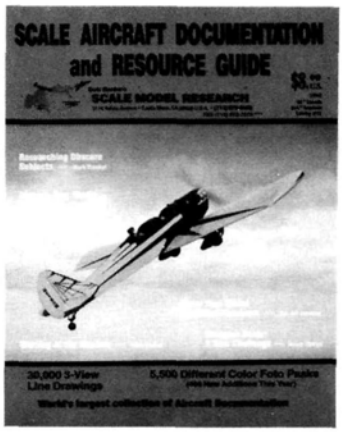


TRILLIUM BALSA LTD.
FW 190D

This 100-inch, large-scale, all-wood kit includes cut and sanded wooden parts, a fiberglass cowl and canopy, plastic blisters, a 5 3/4-inch aluminum spinner, rolled plans and an instruction booklet.

Price—$475.

Trillium Balsa Ltd., 260 Tucson Ave., Unit 2, Tillsonburg, Ontario, Canada; (519) 688-3522; fax (519) 688-3520.



SCALE MODEL RESEARCH
1995 CATALOGUE

This 168-page, 1995 edition of "Bob Banka's Scale Aircraft Documentation and Research Guide" has 12 new articles, 350 new Foto Paäks and more than 2,000 three-view line drawings.

Price—$8 (U.S., Canada); $9 (Mexico); $14 (foreign).

Scale Model Research, 3114 Yukon Ave., Costa Mesa, CA 92626; (714) 979-8058.

Descriptions of products appearing in these pages were derived fro press releases by the manufacturers and/or their advertising agencie The information given here does not constitute endorsement t **Model Airplane News**, nor does it guarantee product performanc When writing to the manufacturer about any product described her be sure to mention that you read about it in **Model Airplane News Manufacturers!** To have your products featured here, address t press releases to **Model Airplane News,** attention: Product Nev 251 Danbury Rd., Wilton, CT 06897.

'INGMASTER

ntinued from page 115)

The documentation supplied with the soft-
re is very complete in describing the how
l why of the program. It also sheds some
ıt on the typical uses of some of the air-
's in the database, which is handy to the
ı-aero-disciplined modeler. Lastly, the
:umentation elaborates on the construc-
ı of a typical model wing. I can find no
lt with this discussion; however, I would
treat it as the only way to build up a
del wing.

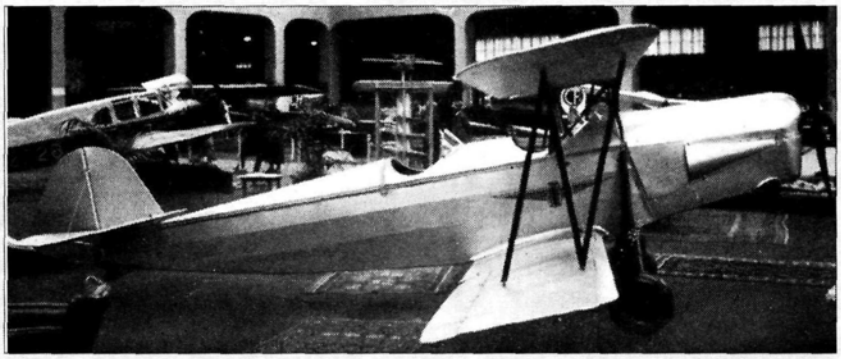
ı conclusion, if you would like to expe-
: the design and construction of your
gs and tails, Wingmaster can help signifi-
tly. Although the documentation is thor-
h, one good read through, and I doubt
will need it again. The program works
l for what it was meant to do (design
gs and wing ribs), and because it can
ınunicate with other CAD programs,
k done here does not have to be repeated
n setting to the task of designing the rest
ıe model.

ldresses are listed alphabetically in the Index of
ufacturers on page 127 ■

NAME THAT PLANE

CAN YOU IDENTIFY THIS AIRCRAFT?

If you can, send your answer to *Model Airplane News*, **Name That Plane Contest** (state issue in which plane appeared), 251 Danbury Rd., Wilton, CT 06897.



CONGRATULATIONS to Dennis Berky of Douglassville, PA, for correctly identifying the November '94 mystery plane. The Miles M.2X Hawk Trainer was designed in 1933 by F. G. Miles of Phillips & Powis Aircraft Ltd. The 6-foot, 8-inch-high, 24-foot-long aircraft had a wingspan of 33 feet and a loaded weight of 1,900 pounds. The plane's powerplant was a 130hp deHavilland Gipsy Major, 4-cylinder, in-line, inverted, air-cooled engine that delivered a top speed of 150mph—at 1,000 feet—and a normal cruise speed of 135mph. In 1934, the aircraft was equipped with the patented Miles slit trailing-edge flap and was used as a standard training plane by many types of flying clubs and flying schools in Great Britain. It was approved for the RAF Reserve Training School, which was operated by Phillips & Powis Aircraft Ltd. Hawk Trainers finished in second and third places in the 1935 King's Cup race. ■

The winner will be drawn four weeks following publication from correct answers received (on a postcard delivered by U.S. Mail), and will receive a free one-year subscription to **Model Airplane News**. If already a subscriber, the winner will receive a free one-year extension of his subscription.

CLUB OF THE MONTH

NORTH DALLAS R/C CLUB
17671 Addison Rd., Apt. 2605,
Dallas, TX 75287

The September edition of the "High Flier," the North Dallas R/C Club's newsletter, tells of the club's successful 11th annual Club Pattern Contest. Doc Hurt, the CD for the past 10 years, thanks club members for their putting on the "best—and largest—pattern meet in Texas!" This busy club isn't only involved in pattern flying, however; they put on a flying exhibition at the local Highland Village Balloon Festival and have Slow and Quickee 500 events, and they're planning a 41.3-mile cross-country event that sounds like quite a challenge.

In addition to event coverage, the "High Flier" features a humorous look at how to "Evaluate Your Pilot Abilities," by Jim Liston, and a "Tips on Technique" page that shares advice from fliers across the nation. "Tighten Up," an article by Nick Sacco, warns fellow pilots of the potential dangers of loose nuts, bolts and screws and offers practical advice on how to secure joints and fasteners. Nick describes one technique that's used in full-size aircraft to ensure that bolts aren't twisted off during flight: run wires through the bolt heads and chain them together.

In "Officer's Corner," club president Don Hafer reminds members to pick up their Gold Leader Club pins—the AMA's recognition of club excellence. Judging from their outstanding newsletter, we think the North Dallas R/C Club also deserves our "Club of the Month" award. Congratulations. Your two complimentary subscriptions to *Model Airplane News* are on their way. ■

by JEF RASKIN

SCALE ALUMINUM FINISHES

Subject: *how to use Coverite's Aluminum Presto to get a realistic metallic finish.*
Source: *Telstar Video Productions Inc., 1501 S. Decker Ave., Ste. 109, Stuart, FL 34994; (800) 972-4847 or (407) 671-6144.*
Summary: *a first-rate tutorial focused on one finishing product.*
List price: *$24.95 ($2.50 S&H)*
Rating: ✈ ✈ ✈ ✈ ✈
Approximate length: *30 minutes*

Telstar brings us another well-done video. Jerry Caudle and Bob Violett won first place in Team Scale at Top Gun last year with their F-80, and if you've seen the models there (or the tapes of the event that have been reviewed here), you know that this model must be as good as they come. It is just beautiful. And the aluminum finish looks perfect, down to the last rivet.

The tape is presented by Jerry, who built the model. He knows what he's doing, and tells exactly what materials, tools and chemicals you need. Jerry even reveals the secrets of what the judges will and won't notice and shows how to remove masking tape without pulling off paint or covering. It will take practice to match the world-class finish shown here (he spent 100 hours on the covering alone), but this tape will give you a head start.

MOLDING FIBERGLASS

Subject: *making fiberglass parts using molds.*
Source: *Fibre Glast Developments Corp., 1944 Neva Dr., Dayton OH 45414; (800) 821-3283 or (513) 274-1159.*
Summary: *clear and well-presented, it is a first-rate tutorial.*
List price: *$39.95*
Rating: ✈ ✈ ✈ ✈ ✈
Approximate length: *40 minutes*

Fibre Glast Developments Corp. has done us a service by showing in detail how to make fiberglass parts. Their motives are not entirely pure since they are selling their products, but the video is not a sales pitch; it's a first-rate tutorial. The basic methods are applicable, of course, to other brands of materials.

Watching the clear photography and listening to a carefully written script that keeps things moving along, you see a vacuum-formed cowl used to form a mold from which many strong fiberglass parts can be made. A printed list of the steps and materials needed is included so that you don't have to take notes. This video is recommended for anybody who wants to learn how to make molded fiberglass parts.

BRAVO MIKE

Subject: *the story of a first-time 1:1 scale airplane builder.*
Source: *First Light Productions, 20511 Skywest Dr., Hayward, CA 94541; (510) 887-4121.*
Summary: *an enjoyable, true story of one man's aeronautical achievement.*
List price: *$15 (approximately)*
Rating: ✈ ✈ ✈ ✈ ✈
Approximate length: *23 minutes*

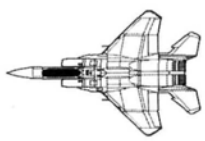
This short film is something any aviation buff will enjoy. It is the story of Mike Campbell and his Lancair 320. Campbell had no interest in aviation (he would become airsick when flying in his father's light plane), until he ended up with "a whole garage of remote-control airplanes" as a result of a trade. He found out there were a lot of things he could do with R/C, especially racing and aerobatics. But (sadly for our hobby), he saw the Lancair 320 videotape, and, then, at an auction he found a kit for sale for $19,000. Not having that kind of money, he offered $5,000 down and $500 per month. The guy took it.

Campbell had no construction experience, but he watched some videotapes (videotapes again!) and learned the techniques. But the videos didn't tell him about the problems of working with itchy fiberglass and smelly resin. He and his wife had to spend two nights in a hotel room after one construction session, and the house smelled for three weeks even though he worked in the garage. Then he sealed the garage door.

Lancair's literature says you can build one of its planes in 1,000 hours but Campbell spent 1,000 hours on sanding prior to finishing. A home-built is never finished, but he was in the air after some 4,500 hours. He found that after the first 1,000 hours, construction gets monotonous, but he learned how to work with the materials. Being a workaholic, he put in 40 hours per week (after work), starting after supper and working into the wee hours. But, eventually, the plane begins to take shape, and you begin to pick up emotionally.

The Lancair is one of the winners in the kit plane arena. Twice as fast as a Cessna 172 with the same engine, it is stressed to 9 G's. This one is modified with oversize ailerons, aileron spades and inverted fuel and oil systems, so that it makes a good aerobatic mount. The tape shows some aerobatics (and beautiful shots of our West Coast going round and round). Campbell can also fly straight, and he set a point-to-point speed record with his home-built.

Then there's the problem of creeping elegance: he started with a basic panel of simple instruments, but now his plane, named "Dream Catcher," is equipped with a moving-map display, CD player, stereo and everything but hot and cold running water. Especially noteworthy is its stunning paint job, with a surprise on the bottom of the plane (you'll have to get the tape to see).



CLASSIFIEDS

RATES: non-commercial—25 cents per word (no commercial ads of any kind accepted at this rate); commercial— 50 cents per word (applies to retailers, manufacturers, etc.); count all initials, numbers name and address, city, state, zip code and phone number. **All ads must be paid for in advance.** To run your ad for more than one month, multiply your payment by the number of months you want it to run. Deadline: the 10th day of the month, 3 months in advance, e.g., *January 10 for the April issue.* We don't furnish box numbers, and it isn't our policy to send tear sheets. **SEND AD AND PAYMENT TO: JILL MOLINARO, CLASSIFIED ADS, Model Airplane News, 251 Danbury Rd., Wilton, CT 06897-3035, or call (203) 834-2326.**

R/C WORLD ORLANDO, FL, CONDO RENTAL: 2 bedroom, furnished. Available weekly or monthly. Low rates. 100-acre flying field with enclosed hangars. Close to Disney World and Epcot Center. For information, please call or write to R/C World, 1302 Stearman Ct., Orlando, FL 32825; (407) 380-6359.

WANTED: built or partially built Ercoupes, Cessna 150, 152, 172, 182, Grumman American Tiger (AA5), American Yankee (AA1), or Mooney M-10 Cadet. Glen Mills, P.O. Box 3393, Mission Viejo, CA 92690; (714) 768-0585 [5/95]

MAKE REAL DECALS with your computer and printer! Send $10 for starter kit and instructions to LABCO, 27563 Dover, Warren, MI 48093-4764 [5/95]

ENGINES: IGNITION, GLOW, DIESEL—new, used, collectors, runners. Sell, trade, buy. Send $3 for huge list to Rob Eierman, 504 Las Posas, Ridgecrest, CA 93555; (619) 375-5537 [5/95]

MODEL MOTORS WANTED—Most types, 1970 and earlier. Cash or trade. T. Crouss, 100 Smyrna, West Springfield, MA 01089. [3/95]

ANTIQUE IGNITION engine parts: excellent reproductions, fuel tanks, points, timers, coils, needle valves, gaskets, etc. Champion spark plugs. Catalogue—$5 (intl. airmail—$7). Aero-Electric, 1301 W. Lafayette St., Sturgis, MI 49091. [2/95]

WANTED: ignition model engines 1930s to 1950s, especially Elf, Baby Cyclone, Brown Jr., Ohlsson Custom and Gold Seal. Also model racecars, any parts, spark plugs, etc.; Woody Bartelt, 1301 W. Lafayette St., Sturgis, MI 49091; (616) 665-9693, or (800) 982-5464. [2/95]

GERMAN AIRCRAFT WW II—handbooks, service part lists, instruction manuals. List—$2. Udo E Hafner, Eugen-Bolz-Str. 15, D-71636 Ludwigsburg, Germany. [5/95]

FLY DAVE BROWN SIMULATOR. Use your transmitter. Works with Futaba, JR, Airtronics, Hitec. Uses Standard joystick connection. For more info, contact Computer Designs, 8530 N. Montana Ave., Helena, MT 59601;(406) 458-9416. [1/95]

ULTRALIGHT AIRCRAFT. New publication has plenty of information, pictures and stories on this exciting flying sport. Buy, sell, trade and kit-built aircraft. You can learn to fly the real thing. Fixed wing, powered parachutes, rotor, balloons and blimps. Sample issue $3. Annual subscription $36. Introductory offer of only $24. "Ultraflight Magazine," 12545 70th St. N., Largo, Fl 34643-3025. [1/95]

AIRSHIPS (MAN): Technical, history, tapes, collectibles. 522 E. Vine, Box 213, W. Covina, CA 91790. [2/95]

MODEL GRAPHICS/VINYL LETTERING. Introducing new 20-page instructional catalogue and model decorating guide. Special offer: any combination of 10, 2-inch letters or numbers, custom-cut and ready to install, with catalogue—$4.95. Graphics A.M.P. Inc., 42a Nancy St., W. Babylon, NY 11704; (516) 253-2702. [2/95]

R/C SKYDIVING—illustrated catalogue: $1. R/C Skydivers, Box 662N, St. Croix Falls, WI 54024. [2/95]

ANTIQUE IGNITION-GLOW PARTS CATALOGUE, ½-inch thick, timers, needle valves, cylinder heads, pistons, points, tanks, spark plugs, racecar parts. Engines: ½As, Baby Cyclones, McCoys, Phantoms, etc. $8 postpaid (U.S.); $20 foreign. Chris Rossbach, R.D. 1, Queensboro Manor, Box 390, Gloversville, N.Y. 12078. [2/95]

SODA-CAN AIRPLANES—replica biplane detail plans with photos $7.50 PPD, Early's Craft, 15069 Valley Blvd. SP 26, Fontana, CA 92335. [8/95]

CARS. Selling model collection, 1973 issues up, 1/24-1/25, individual prices, about 800. Ralph, Box 2423-P, Yakima, WA; (509) 965-0670. [5/95]

DO YOU SPEAK MODEL AIRPLANE? Seventy years of aeromodeling history! All the heroes, contests, models! Paperback, 320 pages, $19.95 postpaid. Also: Old Buzzard's Soaring Book, $16.95. Dave Thornburg, 5 Monticello, Albuquerque, NM 87123; (505) 299-8749 for Visa/MC [6/95]

"REPRODUCE ALMOST ANYTHING": plastic, metal, rubber, plaster, ceramic parts. 40-minute "Basic Silicone Mold Making" videotape shows simple, step-by-step techniques used by movie model makers. A 44-page manual expands on the videotape and includes a nationwide source list of materials—a must for the serious hobbyist. Make better models and/or greater profits. $39.95 plus $3.50 S&H. California residents add $3.30 sales tax. Cherokee Accessories, 4127 Bay St., Ste. 226 M, Fremont, CA 94538. [2/95]

NEW ZEALAND AERO PRODUCTS. Scale plans: Agwagon, Pawnee, Pawnee Brave, Airtruk/Skyfarmer, Fletcher FU-24, Aerobat, Hall's Springfield Bulldog, Typhoon, DC-3/C-47, Fairchild PT-19/Fleet, PT-26, RNZAF CT-4B Airtrainer/CT-4C Turbine Airtrainer and more. Fiberglass parts, hardware packs, color photo packs available. Free documentation with plans. Catalogue/price list (USD)—$5; Visa/MC. 34 Ward Parade, Stirling Point, Bluff, New Zealand; (03)2128192. [2/95]

WANTED: old kits and plans of R/C models from the '50s, '60s and '70s–especially Goldberg, Jetco Top Flite, Sterling and Midwest kits or plans. Willing to pay for duplication of plans. Call Gene (214) 494-0323. [2/95]

SWOOSHIE BAILS OUT! Release a scale-like parachutist! A real crowd-pleaser and a lot of fun! For a brochure, send SASE to Hobby Hut Mfg., 2020 W. 21st N. Ste. #77, Wichita, KS 67203-2107, Dept. MAN. [4/95]

WANTED: Model engines and racecars before 1950. Don Blackburn, P.O. Box 15143, Amarillo, TX 79105; (806) 622-1657. [10/95]

WANTED: Old wooden kits, magazines, WW II IDs and Mfgrs. models. Bill Fornwalt, 103 Dartmouth Ave., Johnstown, PA 15905. [2/95]

MAGAZINE BACK ISSUES—*American Modeler, American Aircraft Modeler, Aeromodeller, Model Airplane News, Model Aircraft, RCM* and more; 1930s–1990s. For list, send SASE to Carolyn Gierke, 1276 Ransom Rd., Lancaster, NY 14086. [3/95]

R/C SAILPLANES—scale, sport, electric. SAM and NFFS powered, towline, Wakefield. F/F scale and sport powered, rubber, towline. Formerly B2 Streamlines Plans Service. Catalogue $2—all models illustrated. Cirrus Aviation, P.O. Box 7093, Depot 4, Victoria, BC, Canada V9B 4Z2. [3/95]

WANTED: OLD, ready-to-run, gas-powered cars, airplanes and boats. Complete or parts. Please write: Dean Barham, 4032 Iowa St., San Diego, CA 92104; (619) 528-1680. [3/95]

MOLD-MAKING/CASTING GUIDEBOOKS—complete techniques and sources of rubbers, plastics, resins, metals and more. For information, contact Castech-MA, Box 16586, Memphis, TN 38186-0586. [3/95]

DRAWINGS ACCURATELY enlarged and copied. Any scale; any size; three-views; magazine plans; old-timers; antiques. Money-back guarantee. Send $2 for info. Roland Friestad, 221 MAN 155th St., Cameron, IL 61423. [5/95]

WANTED: early O.S. FT-120 Gemini crankshaft, part no. 46002005. Earl Colley, 202 Fair Park Ave., Henderson, TX; (903) 657-3605. [3/95]

DEBOLT PLANES–radio control, free-flight, control-line. Send seperate SASE for each list to Fran Ptaszkiewicz 23 Marlee Dr., Tonawanda, NY 14150-4321. [3/95]

PLANS TO BUILD more than 700 tools, machines and accessories for your shop. Catalogue–$1. Wood-Met. Dept. MAN, 3314 W. Shoff Cir. Peoria, IL 61604-5964. [3/95]

AERO FX by Jo Designs: exact-scale, computer-cut, high performance vinyl graphics and paint masks. Lettering; nose art; insignia for scale, pattern, pylon and sport fliers; complete graphic sets available. Call or write for free sample and catalogue. Jo Designs, Rt. 1, Box 225AA, Stratford, OK 74872; (405) 759-3333. [2/95]

CASH FOR ENGINES: ignition, glow, diesel–all types; any condition; sale list, too! Estates my specialty! Send SASE for list. Bob Bournstein, 10970 Marcy Plaza, Omaha, NE 68154; (402) 334-0122. [5/95]

MODEL BOATS: buy, sell, trade, search, restore, or custom-bu Bob Langert, 2350 250th St., Space #30, Lomita, CA 90717; (3 326-9106. [5/

"EIGHT GREAT AIRPLANES You Can Make with a Pencil Index Cards"–booklet. Send $5 to Watershed Publishing, D MAN, 1812 Brookter St., Slidell, LA 70461. [2/

FLIGHTSMITH R/C MAGAZINE: high-quality writing; lim advertising. $14.95/year. FlightSmith, P.O. Box 59905, Chica IL60659; (312) 283-8181. [2/

HISTORIC REPLICAS: Flying Tigers, 94th Aero, Lafay Escadrille accessories; pilot sport shirts, T-shirts, wings, med beer steins, scarves; WW I squadron pins–from $4.95. Free gift order. Catalogue–$1 (refundable). Company of Eagles, 875A Is Dr., Ste. 322N, Alameda, CA 94502. [3/

HELICOPTERS FOR SALE–Three; used. Schluter Futura helico and engine–$300; Schluter Heli-Star–$50; MFA Sport 500 Hughes 500 fuselage (no engine or radio)–$50. Allan Slattery, Fairmount Ave., Jersey City, NJ 07306; (201) 332-2803. [2/

PHOTOVOLTAIC SOLAR PANELS change batteries anywhere solar products. $5 catalog send check/money order to Sunix P.O. Box 3889-MP, San Rafael, CA 94912-3889, dealer inqu (415) 924-6160. [2/

GIANT-SCALE PLANS by Hostetler. Send SASE to Wen Hostetler's Plans, 1041 B Heatherwood, Orrville, OH 44667.[12/

PAYING $75 each for following toy, metal, outboard boat mo 35hp Oliver, 50-100hp Mercurys, 40, 75hp Johnsons, Evinru 35, 60hp Gales, also want Super Tiger, Sea-Fury Twins, 10% boxed. Richard Gronowski, 140 N. Garfield Ave., Traverse City 49686; (616) 941-2111. [3/

JET ENGINES-pulsejets, Jet-X, Turbonique. Monthly newsl $17/yr; $25 international; single issue $2. Catalogue $5. DO JET, P.O. Box 60311-A, Houston, TX 77205; (713) 443-3409.[3

ELECTRONICS ARE NOW: Specalizing in the complete lir Astro Flight equipment and model kits. Plus all of the Lei motors and model kits in stock. Illustrated catalogue with sp electric flight information packet available. Phone: (508) 947-2 $6 USA, $7.50 foreign. Visa & Mastercard. CS Flight System Perry St., Middleboro, MA 02346 [3

HELICOPTER SCHOOL—five days of hands-on instruction wi Cell helicopters and Futaba computer radios. Small classes tai to your individual needs. Beginner to expert. Includes all meal lodging. Over 350 satisfied students and 13,000 flights lo Located on a 67-acre airport used exclusively for R/C trai Owned and operated by Ernie Huber, five-time National Helic Champion and helicopter designer. Send for *free* informtio class schedule *now!* R/C Flight Training Center, P.O. Box Cresent City, FL 32112-0727, or call (800) 452-1677. Ou USA: (904) 698-4275, or fax (904) 698-4724. [3

R/C SKYDIVNG-It's fun. It's different. It's a gravity-powered a ture! New, lower prices, new parachutes, *free* jump plane plans etc. Latest catalogue $1.00. R/C Skydivers, Box 662B, St. Falls, WI 54024. [3

WW I PLANS—peanut to 100 inches. Send 3, $1.00 bills for trated catalogue to Clarke Smiley, 23 Riverbend Rd, Newmark 03857. [3

TRI-VILLAGE R/CER'S—1995 Swapmeet, Wheaton, IL. Sat Feb. 4, 1995, at the *Du Page County Fairgrounds.* Vendor set a.m.; general admission—10 a.m. 130 tables, *free* parkin food, *free* auction, wide aisles, raffle, door prizes and more! $12.00. Admission—$4 per person. Advance registration r mended. To reserve tables or obtain a free flier, call: Jim— 439-6922, or John—(708) 837-1343 after 6 p.m. [3

WANTED: Model engines and racecars before 1956 Blackburn, P.O. Box 15143, Amarillo, TX 79105; (806) 622-16 [1

PLICA SWISS WATCHES—18KT goldplated! Lowest ces! Two-year warranty! Waterproof! SubmDivers, tChronos, others! Phone (404) 682-0609; Fax (404) 682-0. [1/95]

ALE AIRCRAFT DOCUMENTATION and Resource Guide. ger, updated 1995 edition. World's largest commercial col-ion. Over 5,500 different color FOTO-PAAKS and 30,000 e-view line drawings. 168-page resource guide/catalogue 00; Canada—$9.00; foreign—$14.00. Bob Banka's Scale del Research, 3114 Yukon Ave., Costa Mesa, CA 92626; 4) 979-8058. [3/95]

UR BIG SCALE CATALOGUES: SPPS 160 Superscale ns; SPPS 130,000 Documentation Photos, three-views; us Scale Plans Handbook; Argus three-view Scale Drawings. best! $5.00 each USA, Canada. Add $5.00 each Air rseas. SASE for plans list, enlarging prices. Jim Pepino's le Plans and Photo Service, 3209 Madison Ave., ensboro, NC 27403. Phone/fax (910) 292-5239. /Mastercard. [6/95]

NTED: plans for Top Flight's P-51B (early kit), to either copy uy. Also need a muffler for a Weber 10cc (.60) engine. Mike tt, 4101 Isle Dr., Carlsbad, CA 92008; (619) 720-3904. [2/95]

ERNATIONAL AIRCRAFT RESEARCH. Need documenta- ? Include name of aircraft (for availability of documentation) $3 for three-view and photo catalogue. 1447 Helm Ct., issauga, Ontario, Canada L5J 3G3. [4/95]

NTED: Futaba single-stick helicopter radio; whole system or mitter only. Robert, (814) 825-8404. [2/95]

TED-FAN BD-10 kit; 1/5.5 scale; accepts Violett fan only. l SASE for information. Paul Appelbaum, 2232 Riverwood s, Florissant, MO 63031; (314) 839-0486. [3/95]

ERTIGRE ENGINE .60—N.I.B.—never used: $200 OBO. Drosz, 6747 Edgeworth Dr., Orlando, FL 32819; (407) 352- [3/95]

BEE Plans (Benjamin used); 1/3, 1/4, smaller; "Z," R-1, R- Bulldog," "Goon," "Firecracker," monocoupes, Culver, vin, airplane shirts, caps, coasters, wall decor! Big cata-/news, $4 (refundable). Clements, 308 Palo Alto, Caldwell, 605; (208) 459-7608. [4/95]

S: FREE COLOR KITE-O-LOG: (800) 724-7267, ext. K- . Over 200 kites—from easy-to-fly to high-performance ih stunt kites! Go airborne! Get your 80-page, full-color)-Log, today! [5/95]

AZINE TREASURES—*Model Builder*, 136 issues: 2- 7-1973, 10-1974, 10-1975, 11-1976, 11-1978, 12-1979, 80, 12-1981, 10-1982, 8-1983, 8-1984, 7-1985, 2-1987, 88, 4-1989. Make an offer for the lot. R. Smith, 333 c St., #3550, Denver, CO 80207. [2/95]

IS ENLARGED—scanning/plotting services, computer re, free information. Concept, P.O. Box 669E, Poway, CA -0669; (619) 486-2464. [3/95]

IME R/C equipment, magazines, plans, etc. SASE for list. e Wilson, 82 Frazier Way, Marstons Mills, MA 02648; 428-0489. [2/95]

S: Top Gun '94, R/C Know How beginners' guide, North na Big Bird Fun Flys; each, two hours long. Send $19.95 3 S&H to E&H Video, 134 Wildwood Dr., New Bern, NC . NC residents add $1.20 tax; (919) 637-3416. [4/95]

D OPENING of NSG Hobbies! We stock hundreds of radio l airplane kits and accessories at everyday low prices. $1 for a catalogue: P.O. Box 436, Pomona, NY 10970; 362-4375. [3/95]

ADVERTISER INDEX

FINAL APPROACH

A MEASURE OF ACCURACY

Rob Wood and Bryan Keil built this beautiful 22.5-percent-scale Stiletto unlimited racer following detailed measurements taken from the full-scale plane.

Suppose you want to build a museum-scale model of an airplane, but you discover that no accurate drawings exist of the subject? Rob Wood and Bryan Keil faced this problem when they decided to build a giant-scale Stiletto for the unlimited racing circuit. After obtaining a kit of the racer, they soon realized that some of the dimensions of the model were at odds with the available three-views; and to make matters worse, the three-views contradicted one another.

Although it may sound surprising, only one full-scale Stiletto was built. Between '82 and '84, Mustang owner Alan Preston teamed up with pilot Skip Holm and engine builder Dave Zeuschel to convert a stock P-51D into a Gold-Class unlimited racer. Following the then-current trend toward streamlining "heavy iron" warbirds for competition, the team set out to create a low-drag, lightweight, high-power racer that would be capable of winning the top prize at the '84 Reno Grand National Championship races.

Four Classical Racing Team members crouch behind the 22.5-percent-scale model (left to right): Rob Wood, Bryan Keil, Dave Marson and Elaine Murphy.

The team decided to remove the belly scoop, clip the wings, move the cockpit 19 inches aft and install a low-profile canopy. A water-circulation system for engine cooling was devised, and radiators were installed in the wings. Incredible as it sounds, no blueprints were made of the planned modifications; instead, a series of colored renderings that illustrated the proposed changes was commissioned, and work began.

When the transformation was complete, the aircraft was subjected to a "ground-shake test" for speeds up to 525mph (the team had high hopes), and it ultimately took first-place Gold in 1984—setting a new closed-course record with an average speed of 437mph.

Years later, Rob Wood read about the Stiletto in a book about the Reno Air Races by John Tegler, titled, "Gentlemen, You Have a Race" (Wings Publishing, Copyright 1984). The publisher referred him to Mr. Tegler, who, in turn, referred Rob to the Museum of Flying in Santa Monica, CA, where the semi-retired plane was on display. Museum curator and Stiletto co-owner Bruce Lockwood invited Rob and Bryan to "Come on down" to spec out the plane.

Measuring fuse length and wing chord would be a snap, but what about wing thickness and fuselage cross-sections? To get the fuselage sec height, Rob stood on one side of airplane with his tape measure Bryan stood on the other side, a with a tape measure. At each sta (defined by rivet lines), they held t 1½-inch-diameter, hardwood dov on the top and against the botton the fuse (the dowels and measur tapes formed a square box around fuse section). They adjusted the d els until they were parallel. Care taken not to stress the dowels an maintain right angles between dowels and measuring tapes. When both tape meas ments agreed, the measurement was recorded and p tographed. (Photos were necessary to document process; as Rob says, "You can't argue with li beams.") A similar procedure was used to get the fu lage width at the eight or nine bulkhead stations. B home, Rob and Bryan entered the measurements in CAD system to produce a set of 22.5 percent th views that could be used to do ment their kit modifications v the Giant Scale Air Rac Association (GSARA). Th near-heroic efforts in the quest scale accuracy paid off: the dimensions were accepted GSARA and eventually bec the standard for minimum spec the competition. Kits modifie the team have consistently c well at the races, winning sec place Silver at Madera '92, sec and fifth places in Gold at Reno '93, second-p Silver at Galveston '94 and fourth in Gold at Reno Bryan and Rob are currently scratch-buildin Unlimited Mustang for the '95 season.

In a later scale project, Rob and Bryan refined techniques. To measure Patty Wagstaff's Extra Rob used a giant caliper system made of PVC pipe. static model was commissioned by Patty Wagst sponsor, BF Goodrich, and it eventually went on play at the Smithsonian Air and Space Museu Washington, D.C. (a testament to Rob and Bry scale building expertise).

As for the full-scale Stiletto, it is no more. The lective owners have retired the venerable racer an now scheduling its complete restoration to stock co uration (such planes can sell for a cool half a millio

Any modelers who want the exact dimensions c Stiletto can contact Rob at 331 Philip Dr. #302, City, CA 94015; (415) 756-2214; Inte 73623,1145@compuserve.com.

With a laugh, Rob recalls the gracious rece given to him and Bryan by Bruce Lockwood a Museum of Flying. Bruce had the Stiletto washe pulled out of the hangar, and he left Rob and B with these words of advice: "Here she is, boys. Yo do whatever you want; just don't pull the retract le They didn't.

—*Tom Ar*